

**R2**  
**UDC vs IBC**

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**R-2 Rated Assemblies**

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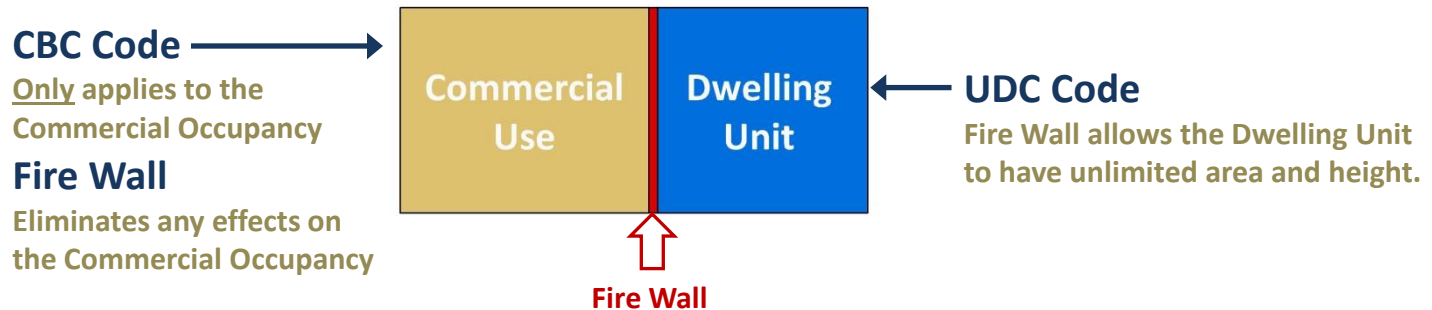
**R-2 Accessibility  
& Patio Doors**



# SPS 361.02 SCOPE

## WHEN UDC STOPS AND CBC BEGINS - SCENARIOS

### SCENARIO 1 - 1 Building with 1 Commercial Occupancy and 1 Dwelling Unit Separated by Fire Wall

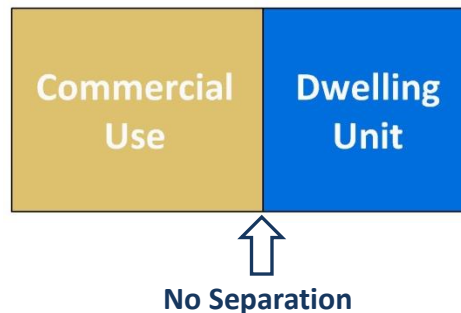


### SCENARIO 2 – 1 Building with 1 Commercial Occupancy and 1 Dwelling Unit Not Separated by Fire Wall

#### No Separation Provided

The effects of the Dwelling Unit on the Commercial Occupancy must be considered.

EXAMPLE: Fuel-Fired equipment and garages may need to be separated per the CBC requirements.



#### Other Considerations

The enclosing walls of the Dwelling Unit will be considered in determining the class of construction for building height and area.



# SPS 361.02 SCOPE

## WHEN UDC STOPS AND CBC BEGINS - SCENARIOS

### SCENARIO 3 – A Public or Private Family Daycare

Daycare serving up to 8 children in a Dwelling Unit of a 1 or 2 Family Dwelling, the UDC applies throughout. Each family is permitted to operate separate family child care centers serving up to 8 children and remain within the scope of the UDC throughout.

### SCENARIO 4 – Vacation Homes

A Vacation Home that is rented to a large single group of guests; the UDC applies.

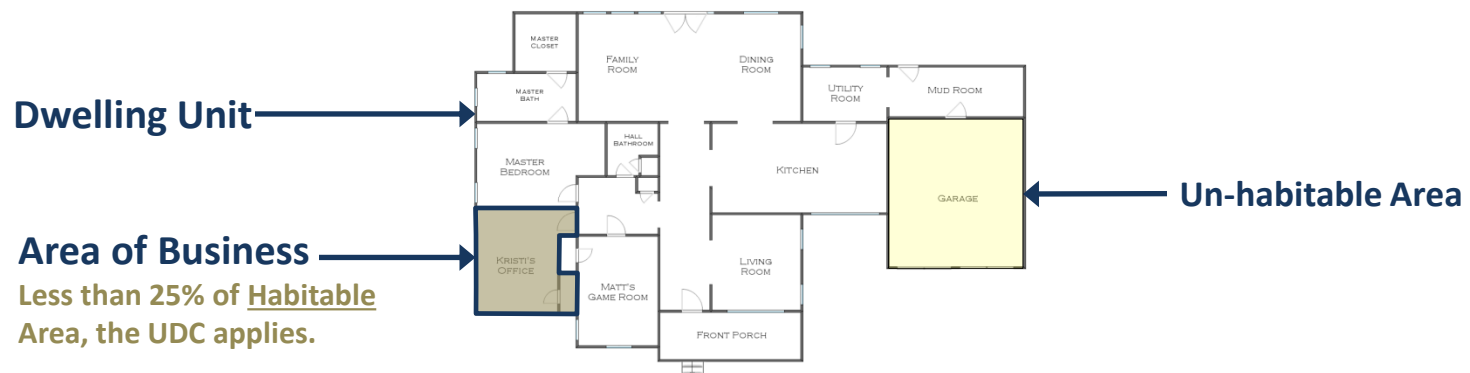
### SCENARIO 5 – Transient Lodging

A Single or Attached Dwelling Units used for Transient Lodging; the UDC applies.

### SCENARIO 6 - Home Occupations

SPS 361.02 (4) Home Occupation is any business, profession, trade or employment conducted in a dwelling unit, that may involve an immediate family or household and a maximum of one other unrelated person, but does not involve the following:

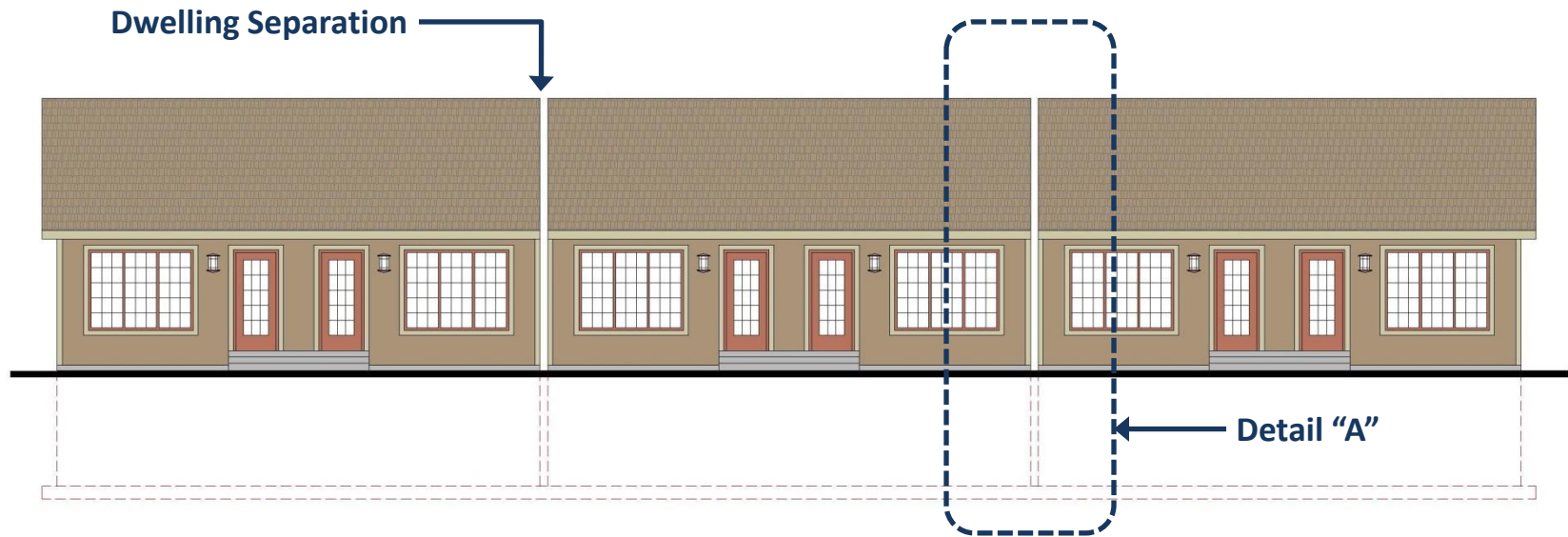
- (a) Explosives, fireworks or repair of motor vehicles.
- (b) More than 25% of the habitable floor area of the dwelling unit.



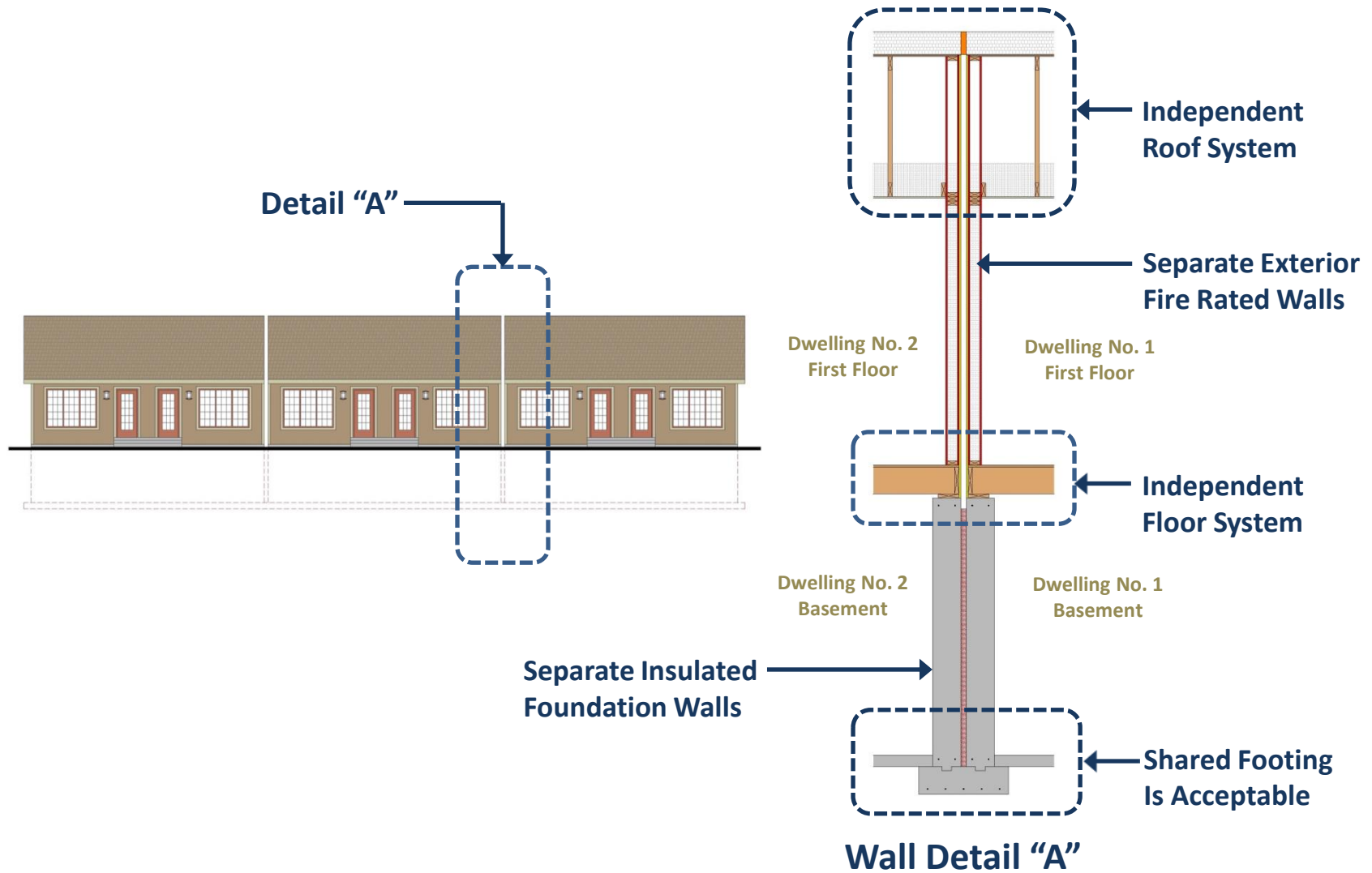
# SPS 320.04(6) – DWELLING SEPARATION

## IBC VS IRC

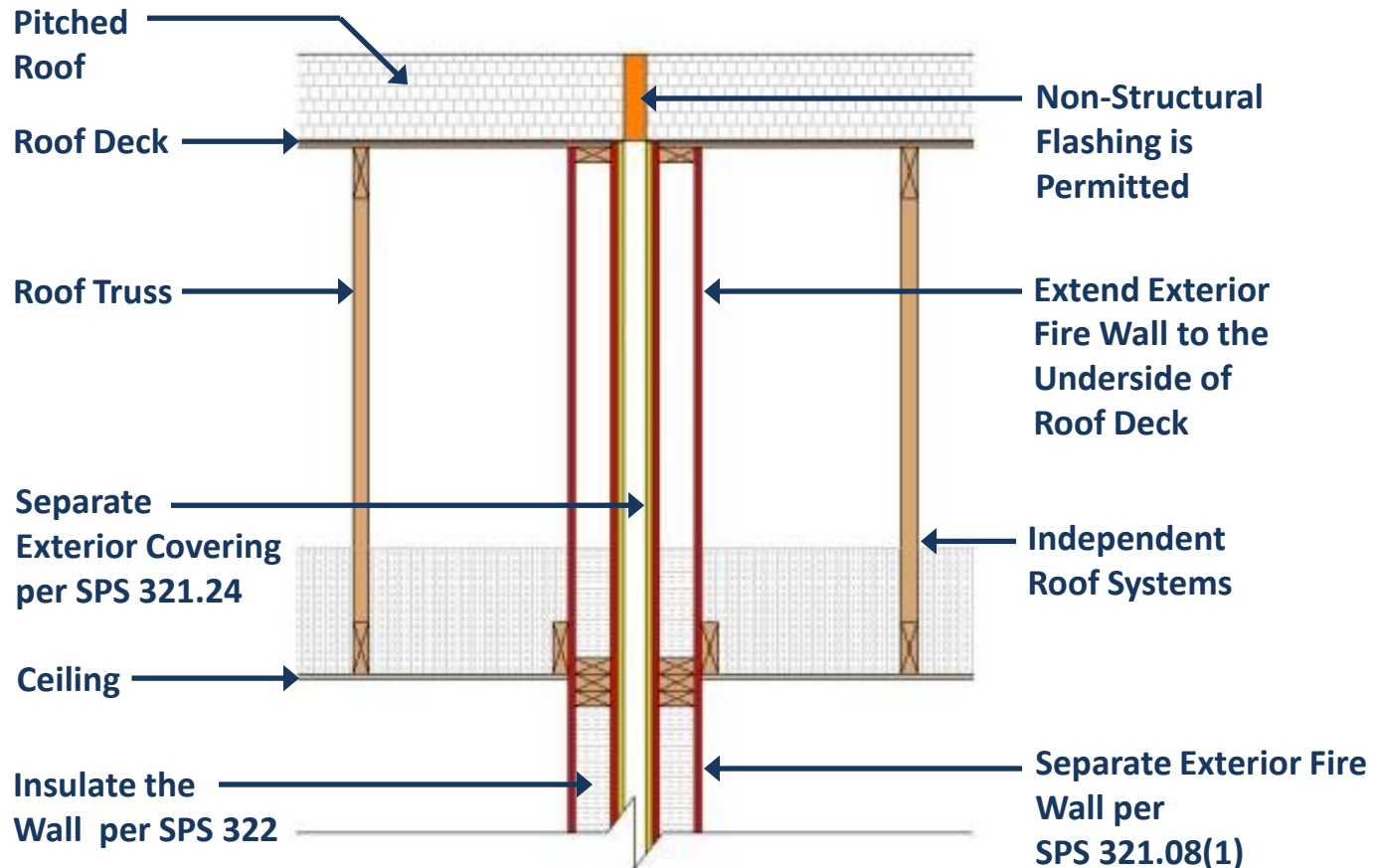
- 3 or more Attached Dwellings; Commercial Building Code applies.
  - IBC Section - 202 Definitions. Townhouse: A single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with open space on at least two sides.
  - Attached means some construction that is shared by the units; other than footings and other bearing materials.
- 3 or more Adjacent but Unattached Dwelling Units; Uniform Dwelling Code applies.



# UDC UNIT SEPARATION

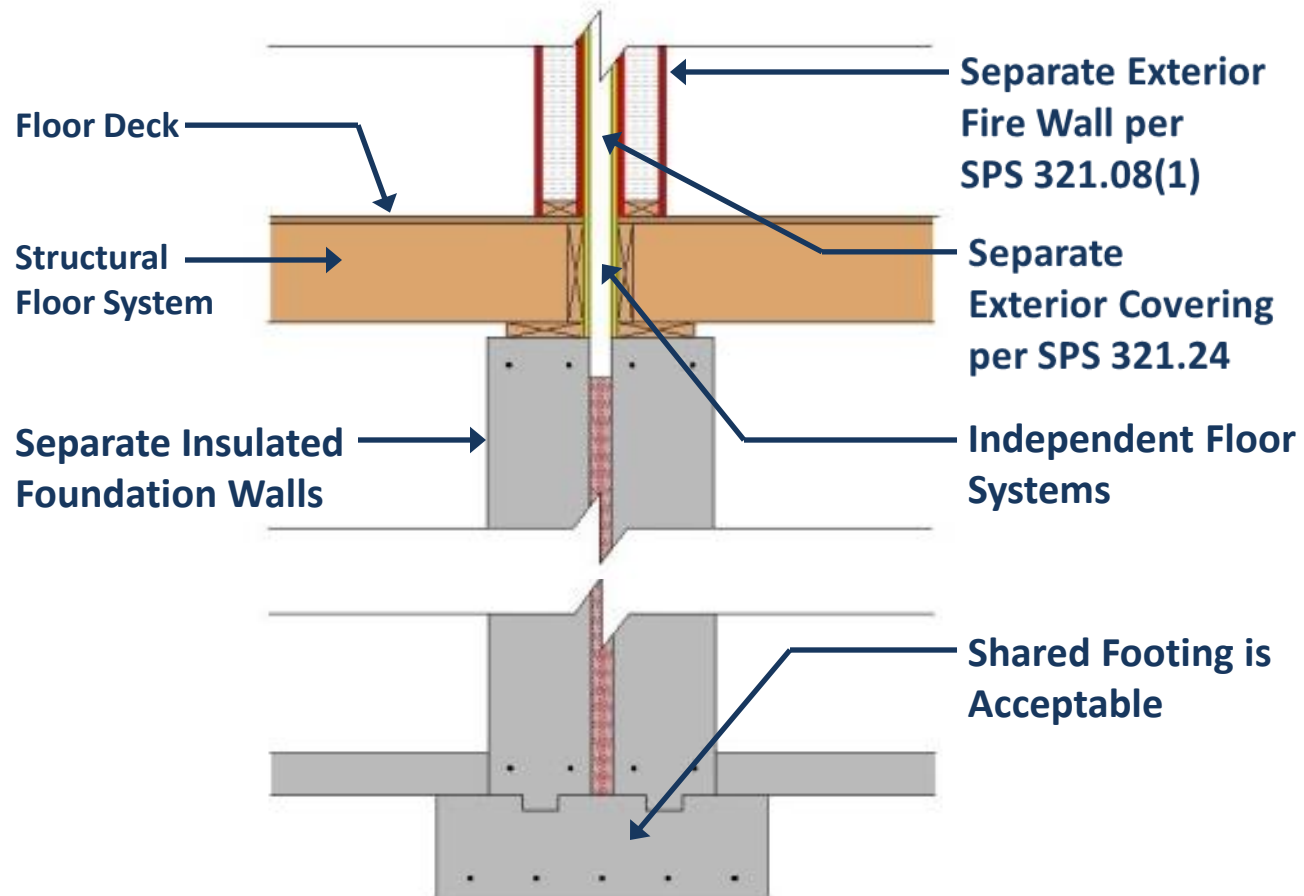


# UDC UNIT SEPARATION ENLARGED ROOF DETAIL



# UDC UNIT SEPARATION

## ENLARGED FLOOR/FOOTING DETAILS

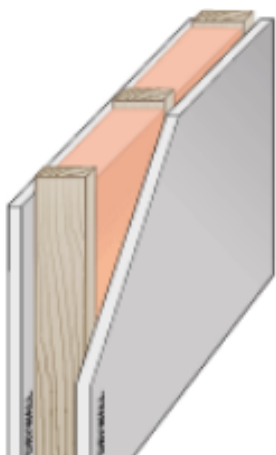


# SPS 321.08(1) EXTERIOR FIRE WALL

**FIRE SEPARATION.** Dwelling Units shall be separated from garage spaces, accessory buildings, property lines and other dwelling units in accordance to Table 321.08.

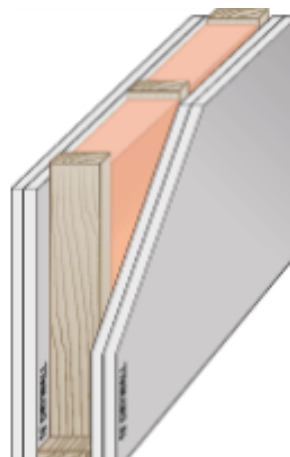
**TABLE 321.08**

BETWEEN DWELLING AND:	DISTANCE BETWEEN OBJECTS	FIRE RATED CONSTRUCTION
Another Dwelling on Same Property	Less than 5 feet	3/4 Hour Wall 1/3 hour Door or Window
Another Dwelling on Same Property	5 to 10 feet	3/4 Hour Wall No Opening Requirements
Another Dwelling on Same Property	More than 10 feet	No Requirements



## DWELLING SEPARATION OPTION 1

**1 Layer 5/8" Gypsum Wallboard  
on Both Sides.  
Joints Taped or Sealed**



## DWELLING SEPARATION OPTION 2

**2 Layer 1/2" Gypsum Wallboard  
on Both Sides.  
Stagger and Tape Joints.**



# SPS 321.24 EXTERIOR COVERING

Acceptable water-resistive barrier materials include polymeric-based house wraps and spray-applied water-resistive barriers installed per the manufacturer's instructions, #15 or greater asphalt-saturated felts that comply with ASTM D 226 for Type I felt and extruded foam sheathing with permanently taped joints. Duct tape or similar will not result in a permanently taped joint.

**No siding or finished surface material needs to be in place before insulation can be installed.**

Polymer-based house wraps shall meet all of the following requirements:



- A water vapor permeability rating of 5 perms or higher when tested in accordance with ASTM E96.
- An acceptable water-resistance rating determined in accordance with ASTM D779, AATCC 127 or CCMC 07102.
- Asphalt-saturated felt or "tar paper" is not a polymeric-based house wrap.
- Common Polymer House Wrap Manufacturer's: *Blaine, DuPont "TyVek", DRYline, Certainteed CertaWrap, Owens-Corning Pink Wrap, TyPar, HardieWrap, Pactiv Wrap*



# DWELLING UNIT SEPARATION PENETRATIONS



## SPS 321.08 (2) PENETRATION (a) DUCTS.

Except as allowed under Subdivision 2, all heating ducts that penetrate a required separation shall be protected with a listed fire damper with a rating of at least 90 minutes.

## SUBDIVISION 2 – EXCEPTIONS

- A. There is a minimum of 6 feet of continuous steel ductwork on at least one side of the penetration.



← Verify that all penetrations are fire stopped.

- B. The duct has a maximum cross section area of 20 square inches.



20 square inches equals either a 4" x 5" rectangular duct or a 5" diameter round duct.



# R-2 TOWNHOUSE

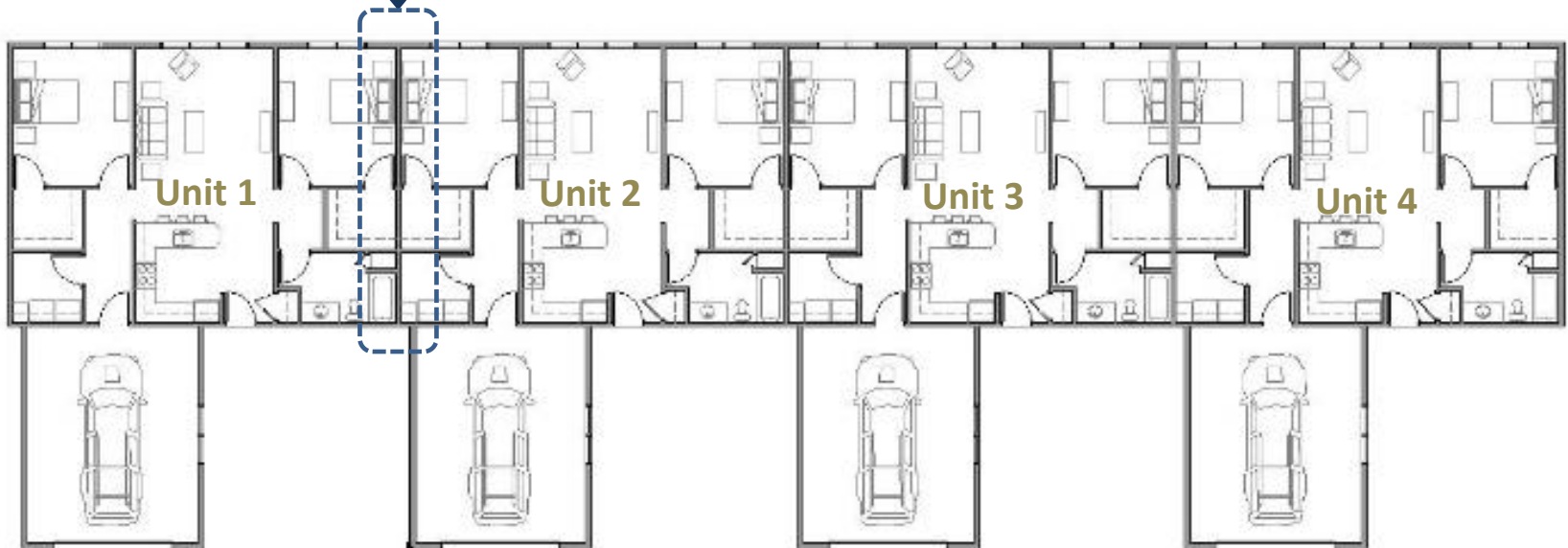
If the Dwelling Unit Wall Separation is Constructed Per IBC 420.2 (1/2 hour Fire Rating), then a NFPA 13R Sprinkler System is Required.

## IBC 310.1 Residential Group R

R-2 Residential occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature, including: Apartment/Townhouses.

## IBC 903.3.1.2 NFPA 13R

Sprinkler Systems Where allowed in buildings of Group R, up to and including four stories in height, automatic sprinkler systems shall be installed throughout in accordance with NFPA 13R.



## Prototypical Townhouse

**Townhouse:** A single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with a yard or public way on at least two sides.



# R-2 TOWNHOUSE

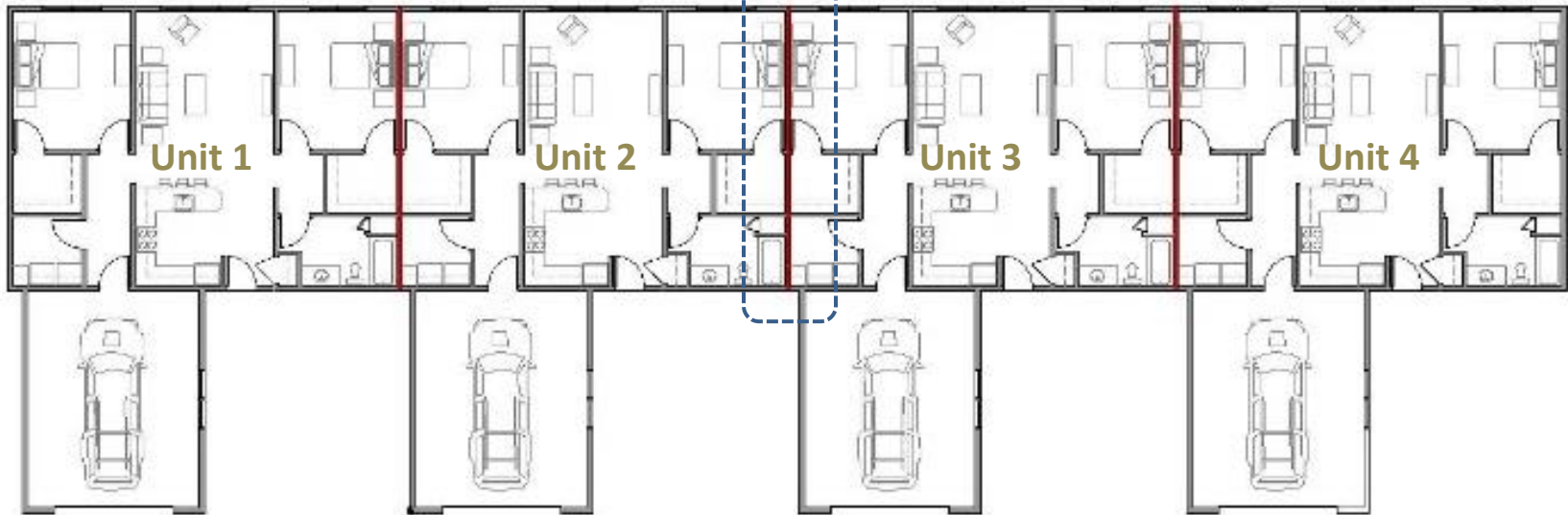
## SPS 362.0903(c)

An automatic sprinkler system installed in a townhouse may conform with NFPA 13D provided:

1. The townhouse does not exceed more than 3 stories in height.
2. Each dwelling unit shall be separated from other dwelling units by at least one hour fire-resistive-rated separation walls constructed in accordance of IBC section 706 and does not contain any openings or have any plumbing or mechanical equipment. The separation wall does not have to comply with the structural stability requirements of IBC section 706.2 or the horizontal continuity requirements of IBC section 706.5.

### Unit Wall Separation:

One Hour Per IBC 706.



Prototypical Townhouse



# TOWNHOUSE 13D UNIT SEPARATION

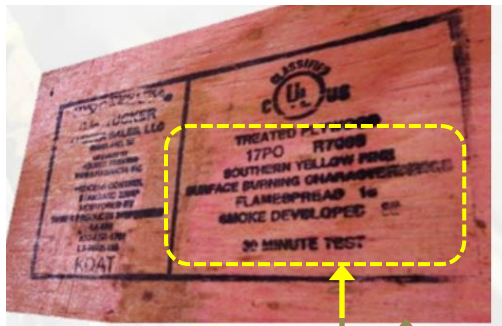
## CONSTRUCTED PER IBC SECTION 706

### IBC 706.6

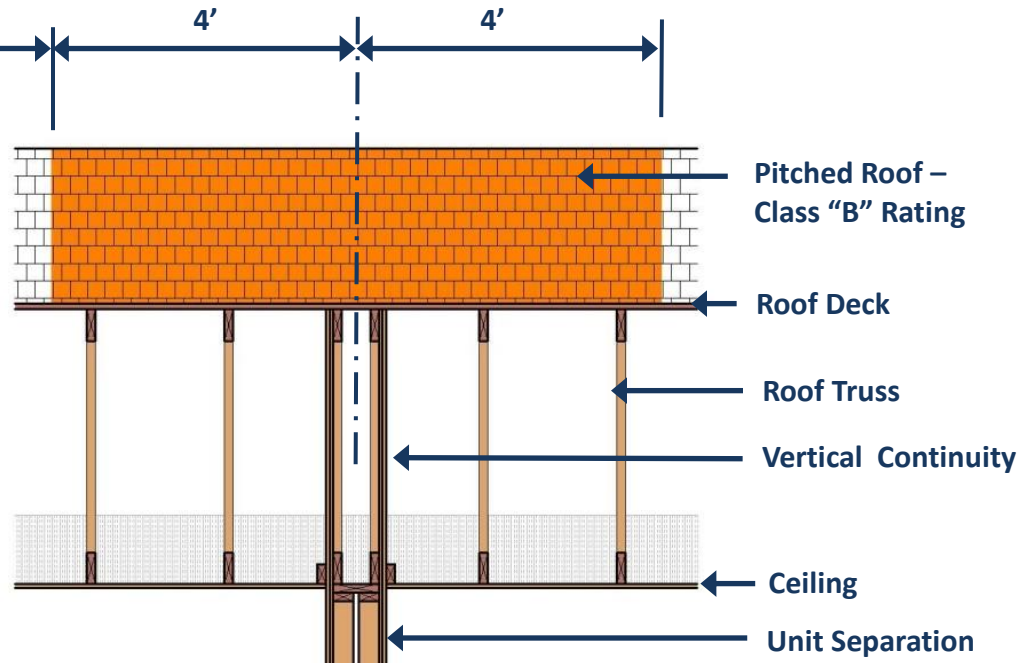
#### Key Construction Details

- 4.1. No openings within 4 feet of the fire wall.
- 4.2. The roof is Rated Class B.
- 4.3. The roof deck is constructed of fire-retardant-treated wood or the roof is protected with 5/8" gypsum drywall directly beneath the underside of the roof deck.

#### Identifying FT Plywood:



- FTP will be labeled.
- Typically – FT plywood will have a red hue.



### IBC 706.2 Structural Stability

NOT REQUIRED

### IBC 706.4 Horizontal Continuity

NOT REQUIRED



# R-2 TOWNHOUSE

## ATTACHED GARAGES

### IBC 406.1.1 Classification.

Buildings or parts of buildings classified as a “U” Occupancies shall not exceed 1,000 square feet in area. Any portion of the building that exceeds 1,000 square feet shall be classified as a S-2 Occupancy group.

### IBC 406.1.2 Area increase.

An “U” Occupancies used for the storage of private motor vehicles where no repair work is completed or fuel is dispensed are permitted to be 3,000 square feet. A “U” Occupancy shall be permitted to be in the same building, provided each 3,000-square-foot area is separated by 2 hour fire walls complying with Section 706 or be classified as a S-2 Occupancy.

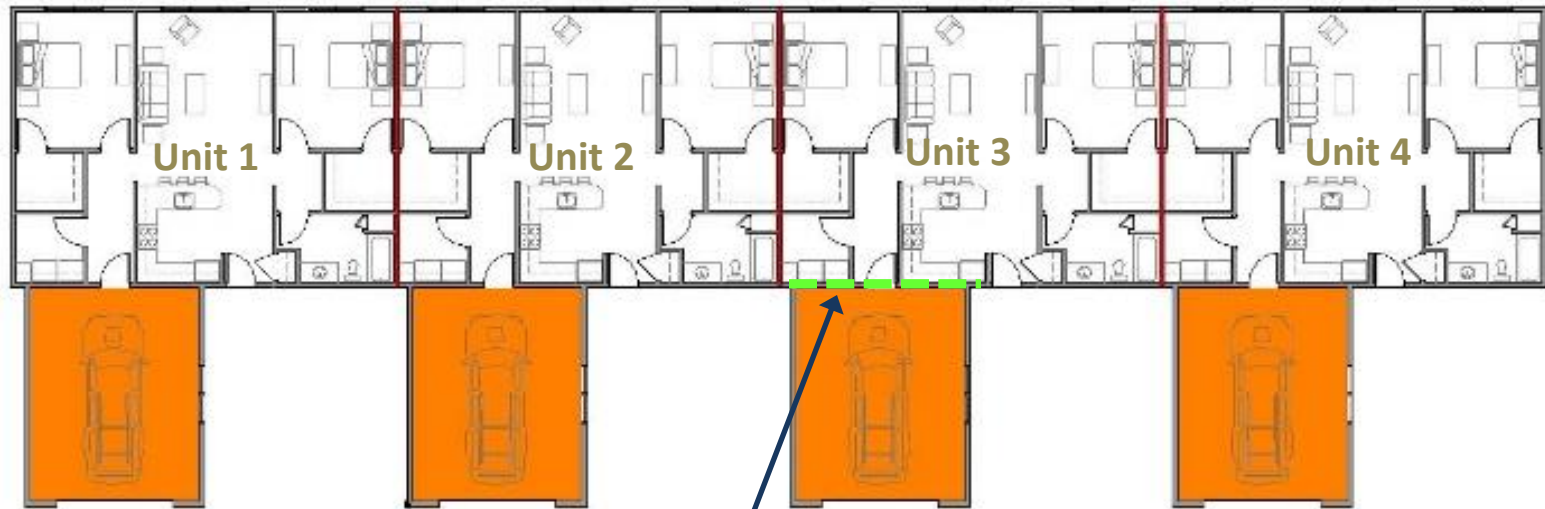


Attached Garages: “U” Occupancy if Aggregate Area is Less Than 3,000 Square Feet or each 3,000 s.f. is separated by a 2 Hour Fire Wall.



# R-2 TOWNHOUSE

## UNIT/GARAGE SEPARATION



### IBC 406.1.4 Unit/Garage Separation.

1. The private garage shall be separated from the dwelling unit and its attic area by a minimum of 1/2" gypsum drywall applied to the garage side. Garages beneath habitable rooms shall be separated from all habitable rooms above by not less than a 5/8" Type X gypsum drywall. Door openings between a private garage and the dwelling unit shall be equipped with either solid wood doors or solid or honeycomb core steel doors not less than 1 3/8" inches thick, or doors in compliance with Section 715.4.3. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Doors shall be self-closing and self-latching.
2. Ducts in a private garage and ducts penetrating the walls or ceilings separating the dwelling unit from the garage shall be constructed of a minimum 0.019-inch sheet steel and shall have no openings into the garage.



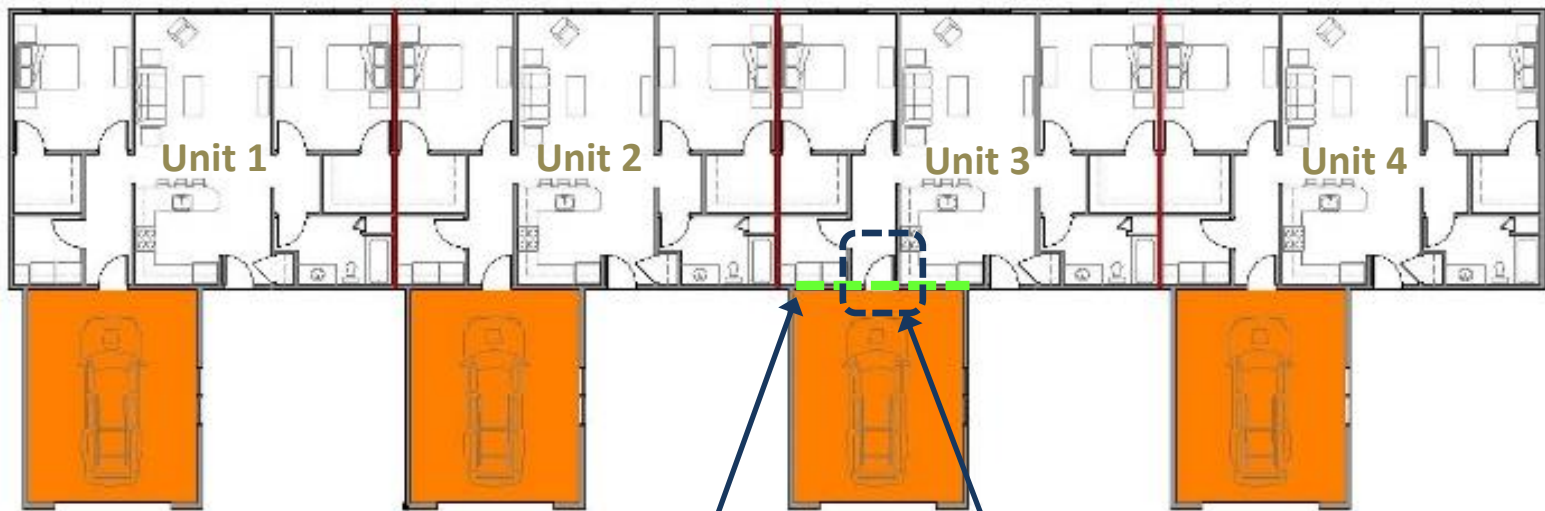
# R-2 TOWNHOUSE

## UNIT/GARAGE SEPARATION ALTERNATIVE

### WISCONSIN BUILDING PRODUCT EVALUATION 201502

#### Unit/Garage Separation Alternative

**2015** IBC 406.3.1 - Limits the size of a Group U attached garage to 1,000 square feet but allows multiple private garages as long as each garage is separated by a 1 hour Fire Barrier in accordance with Section 707 and/or a 1 hour horizontal fire separation in accordance with Section 711.



#### Alternate Unit/Garage Separation

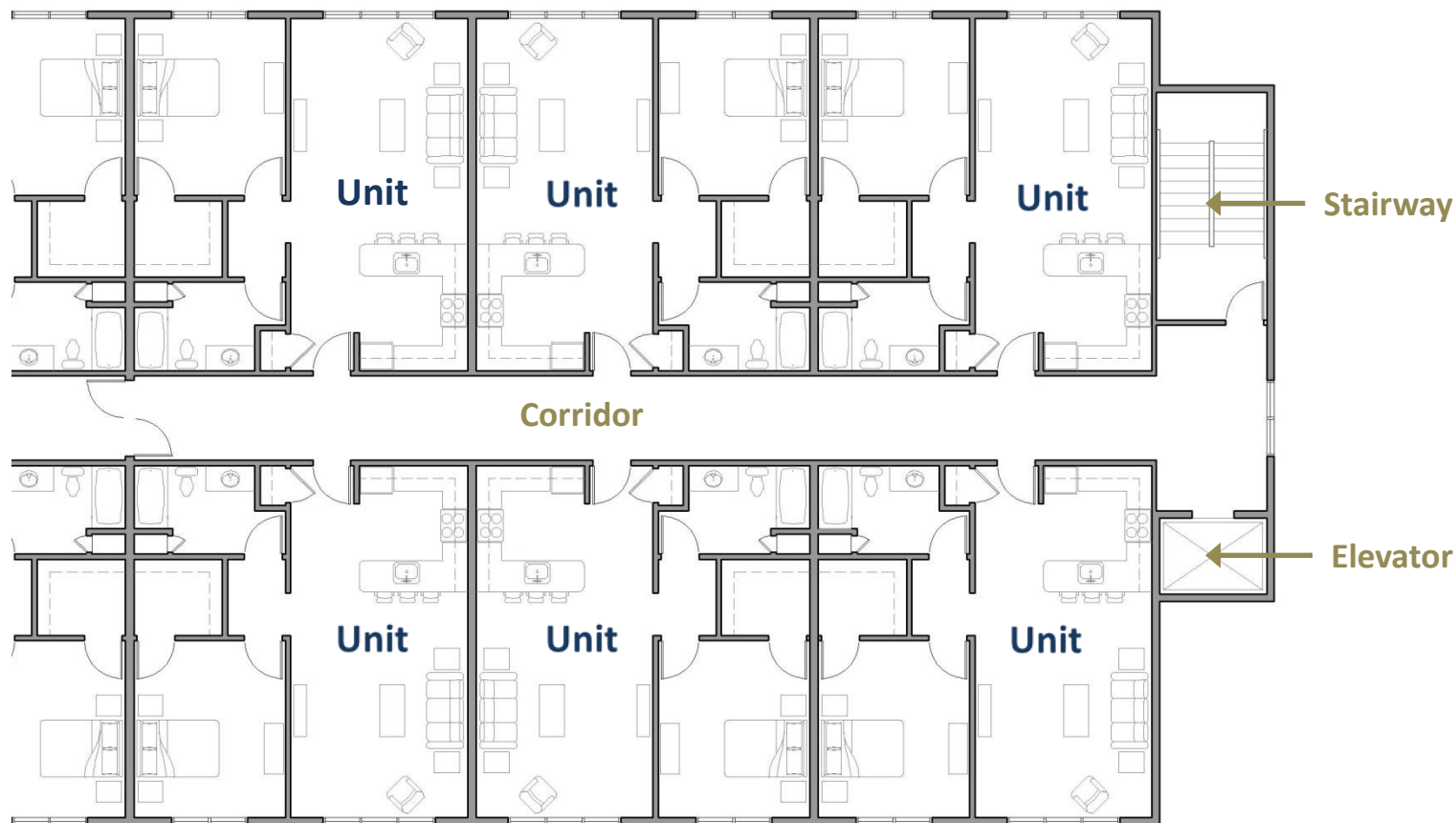
**1 Hour Fire Rated Construction** - shall have continuity that extends from the top of the floor assembly below to the underside of the roof deck.

Fire Rated Door Assemblies and Wall Penetration Protection Required.



# PROTOTYPICAL R-2 APARTMENT

## CONSTRUCTION FIRE RATING REFERENCE FIRE WALL – FIRE BARRIERS – FIRE PARTITIONS



# R-2 APARTMENT – FIRE WALLS

**IBC 706 Fire Walls**   
**Fire Rating - IBC Table 706.4**  
2 Hours for R-2

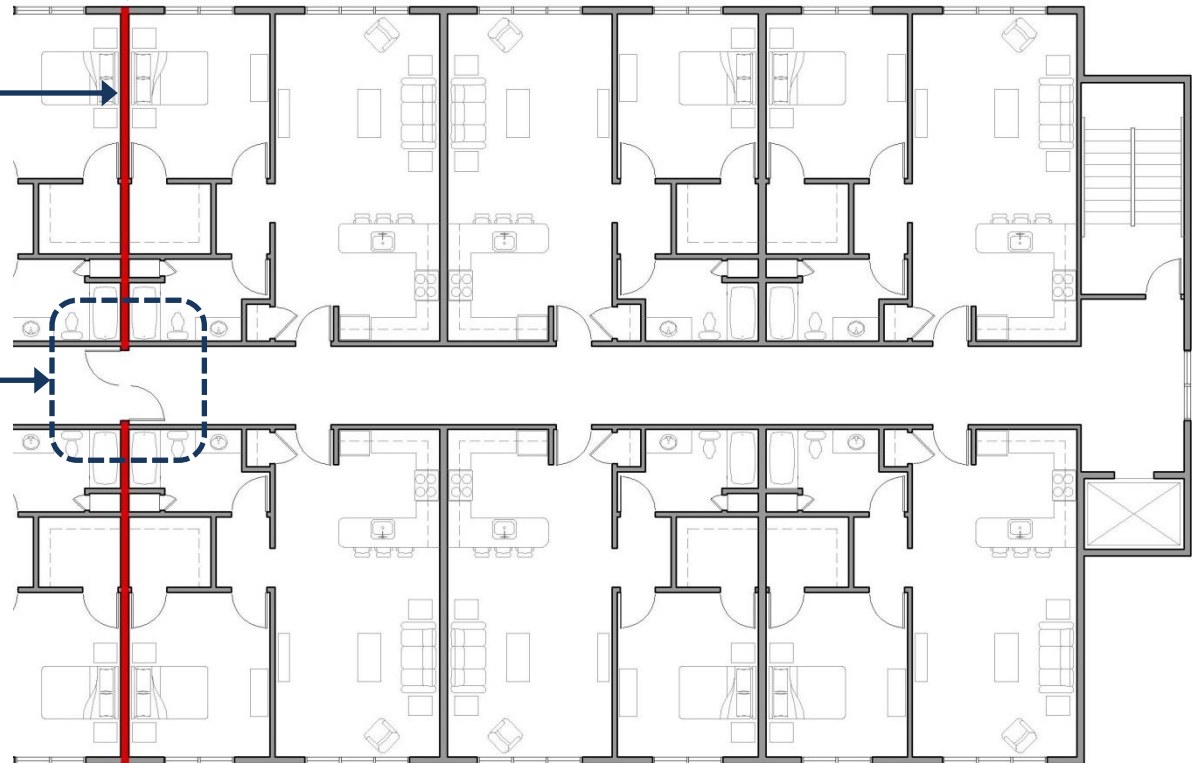
**Horizontal Continuity; IBC 706.4.**

Fire Walls protected by an automatic sprinkler system can terminate at exterior face of the exterior wall.

**IBC 706.3 Materials**  
Fire walls shall be of any approved noncombustible materials except Buildings for Type V construction.

**IBC 706.8 Openings**  
Openings shall not be limited to 156 square feet when equipped with an sprinkler system.

**IBC 715.4 Fire Doors -**  
**IBC Table 715.4 Ratings**  
1 ½ Hour Assembly Rating

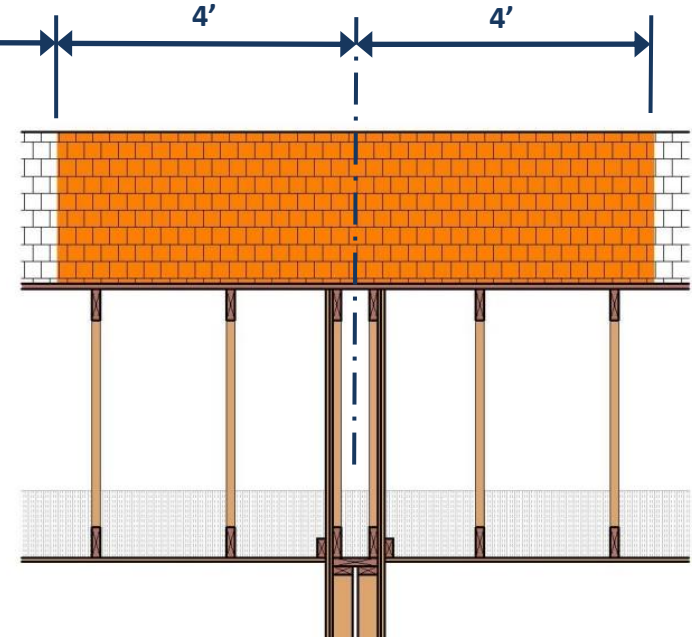


# R-2 FIRE WALL CONSTRUCTION

## IBC 706.7 Exception 4

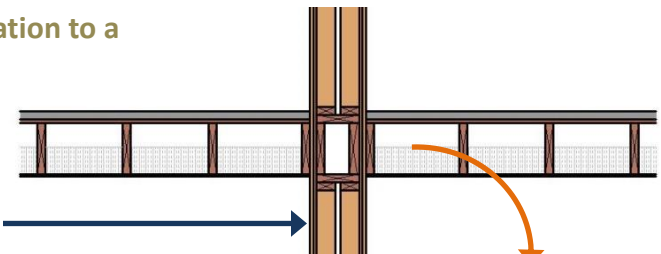
Type III, IV & V construction, walls can end at the underside of combustible sheathing provided:

- 4.1. No openings within 4 feet of the fire wall.
- 4.2. The roof is Rated Class B.
- 4.3. The roof deck is constructed of fire-retardant-treated wood or the roof is protected with 5/8" gypsum drywall directly beneath the underside of the roof deck.



## IBC 706.6 Vertical Continuity

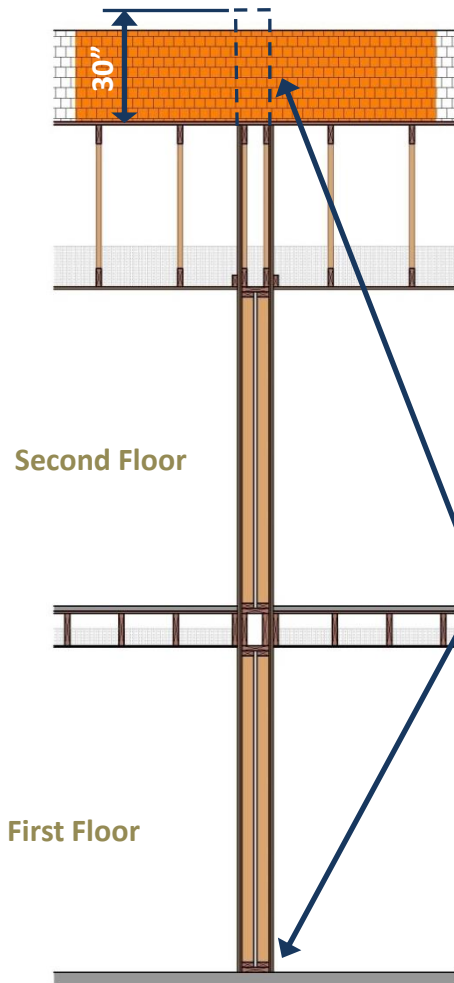
Fire walls shall extend from the foundation to a point at 30 inches above both roofs.



## IBC 706.2 Structural Stability

Fire walls shall have structural stability to allow collapse of construction on either side without collapse of the wall.

Wall Shall Be Designed to Allow Floor and/or Roof Structure to Collapse Alone.



Second Floor

First Floor



# R-2 APARTMENTS – SHAFT WALLS

## IBC 708.2 Shaft (Stair Enclosures)

Openings through a floor/ceiling assembly shall be protected by a shaft enclosure.

## IBC 708.4 Fire-Rating.

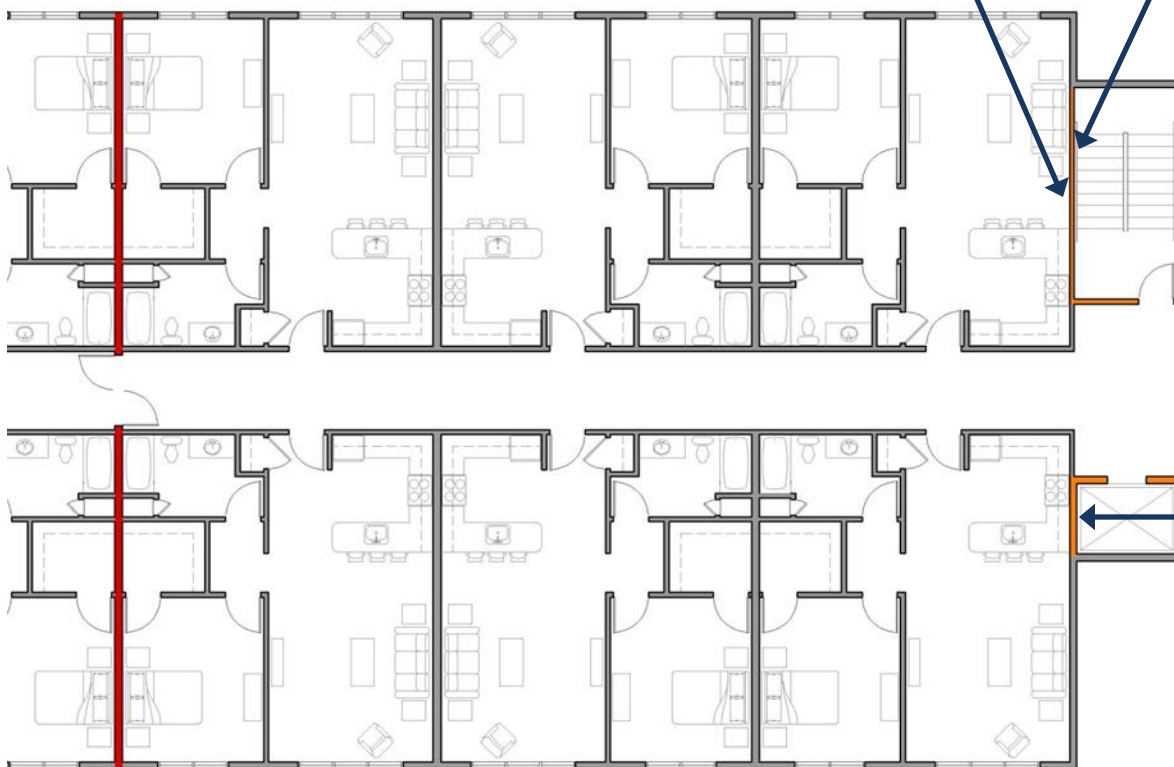
Shaft enclosures shall have a rating of not less than 2 hours where connecting four stories or more, and not less than 1 hour where connecting less than four stories.

## IBC 708.6 Exterior Walls.

Where exterior walls serve as a part of a required shaft, enclosure requirements shall not apply.

## IBC 708.14 Elevator

Elevator enclosures shall be constructed in accordance with Section 708 and Chapter 30.



# R-2 SHAFT WALL CONSTRUCTION

## IBC 708.1 General.

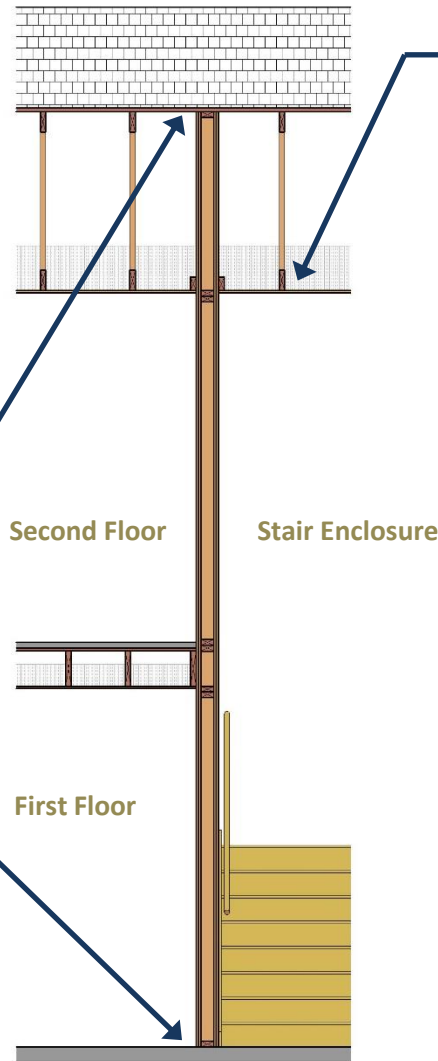
Shaft enclosures shall be constructed as fire barriers in accordance with Section 707 or horizontal assemblies in accordance with Section 712, or both.

## IBC 708.7 Openings

Openings in a shaft enclosure shall be protected in accordance with Section 715 as required for fire barriers. Doors shall be self- or automatic-closing by smoke detection in accordance with Section 715.4.8.3.

## IBC 707.5 Continuity

Fire barriers shall extend from the top of the floor assembly below to the underside of the roof deck and shall be securely attached. Fire barriers shall be continuous through concealed spaces; such as the space above a suspended ceiling.



## Common Error

Shaft Wall is designed or built to underside of the Roof Truss System and not to the underside of the Roof Deck.

Even if the Roof System is an Approved UL Assembly (Example: Type VB Construction); the Shaft Wall shall extend to the Underside of the Roof Deck.

## IBC 713.5 Penetrations

Penetrations in smoke barriers shall be tested in accordance of UL 1479 for air leakage.

Most Firestop Products meet the requirements of UL 1479.



# R-2 APARTMENTS - CORRIDORS

## IBC 1018.1 Corridors

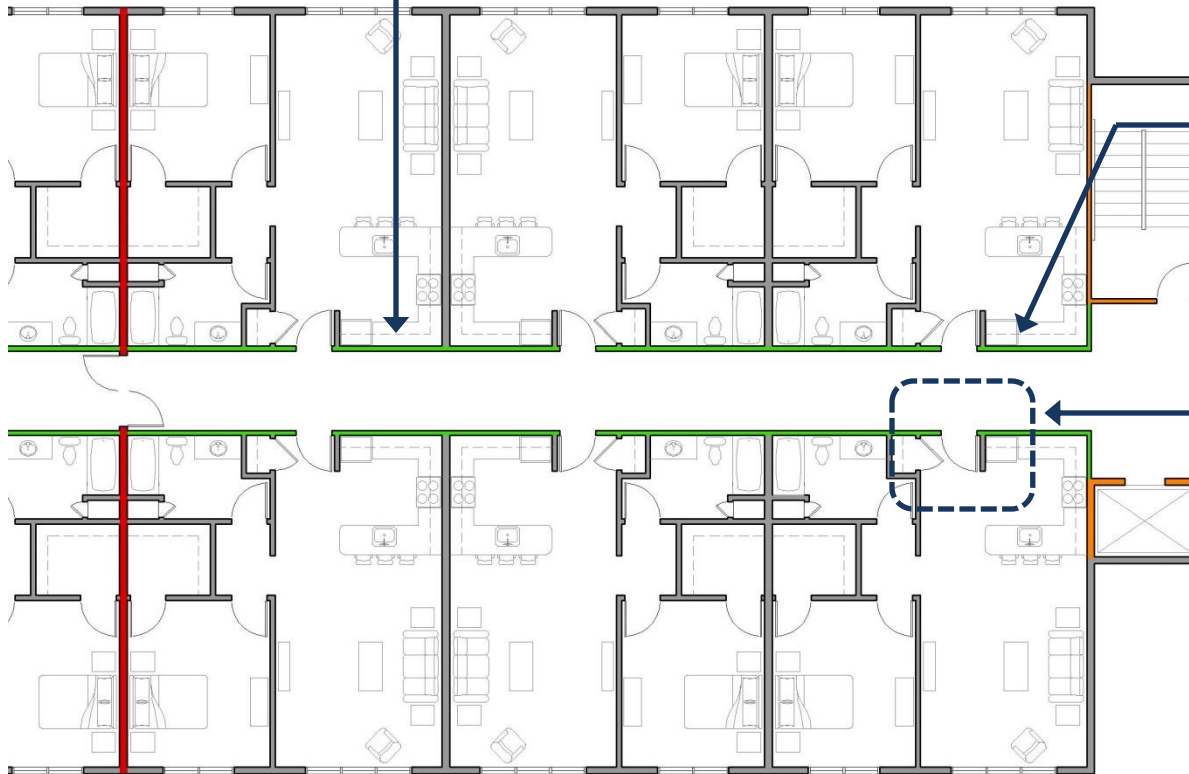
Fire-resistance rating in accordance with Table 1018.1. The corridor walls shall comply with Section 709 for fire partitions.

## IBC Table 1018.1

With an Occupant Load greater than 10, Wall Fire Rating shall be 30 minutes.

## 715.4.3 Door Assemblies

Fire door assemblies require a fire protection rating of 20 minutes tested in accordance with NFPA 252 or UL 10C without the hose stream test.



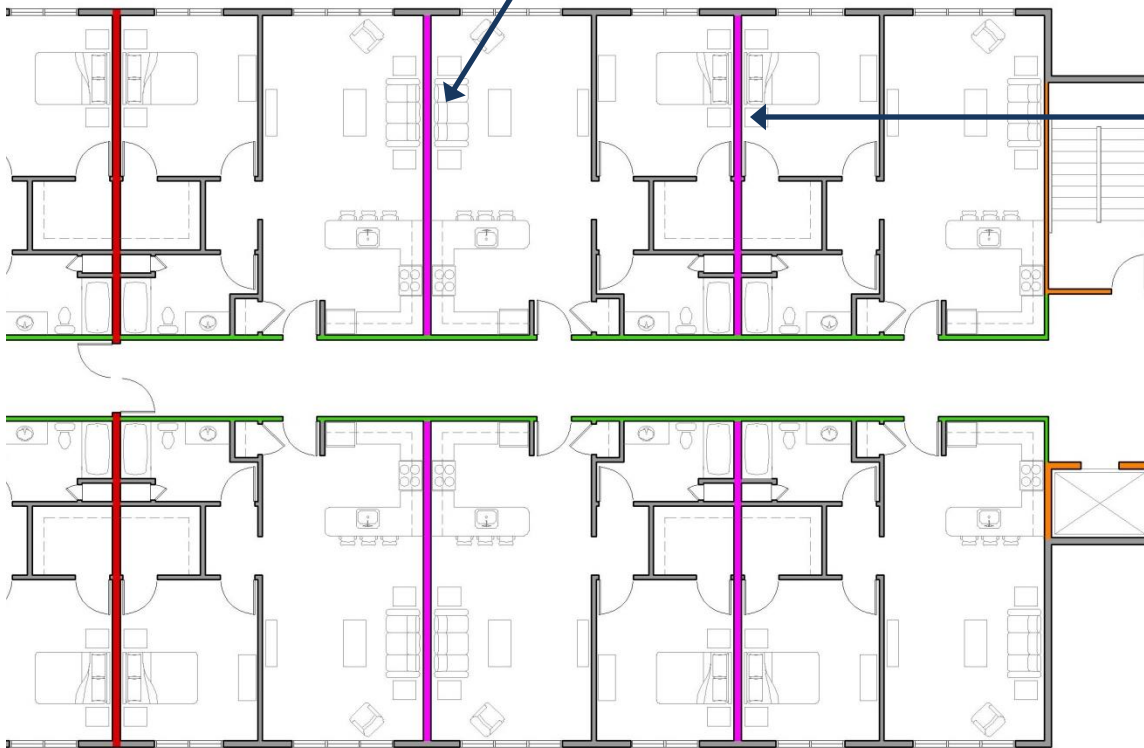
# R-2 APARTMENTS – DWELLING UNIT SEPARATIONS

## IBC 709.1 Dwelling Unit Separations

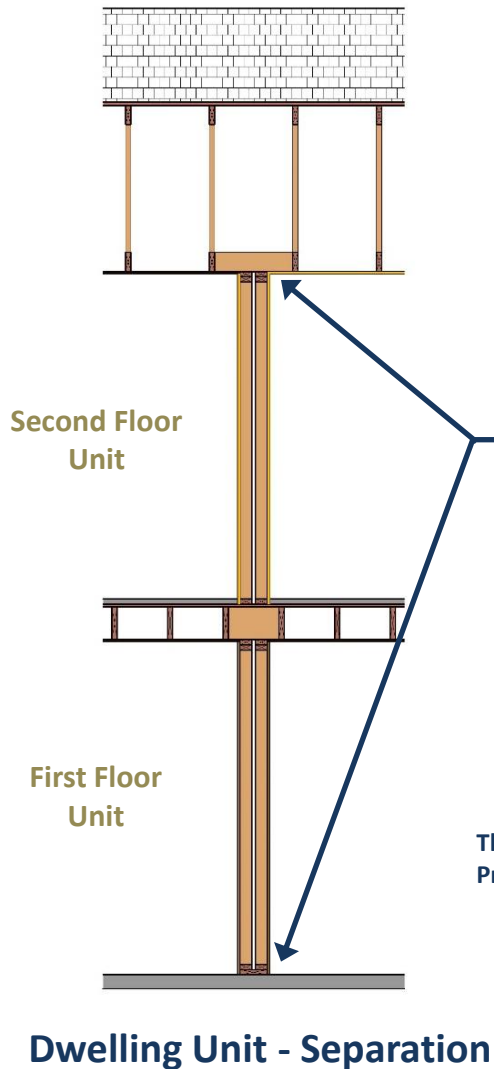
Walls separating dwelling units in the same building as required by Section 420.2.

## IBC 709.3 (2) Fire Ratings

Dwelling Unit separations in buildings of Type IIB, IIIB and VB construction shall have fire ratings of not less than 1/2 hour in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.



# R2 DWELLING SEPARATIONS



## IBC 420.2 Separation Walls

Walls separating dwelling units in the same building shall be constructed as fire partitions in accordance with Section 709.

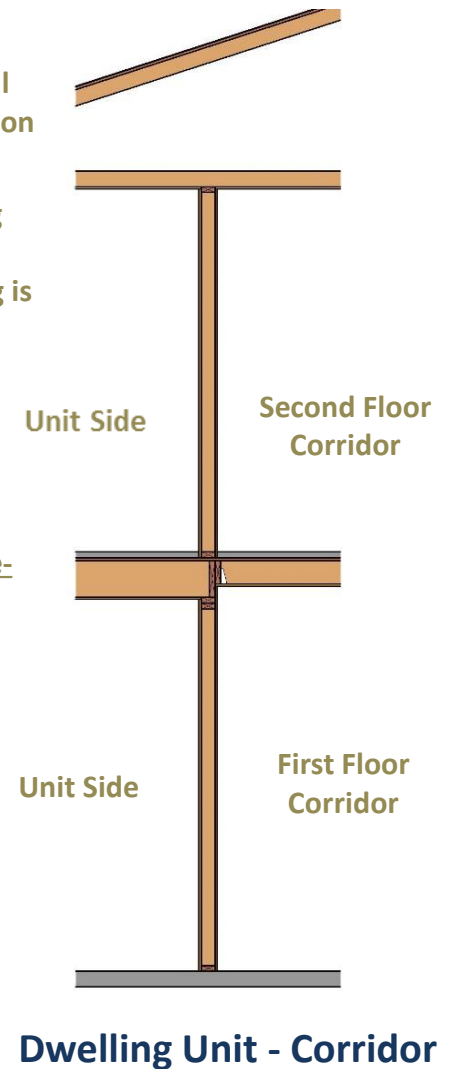
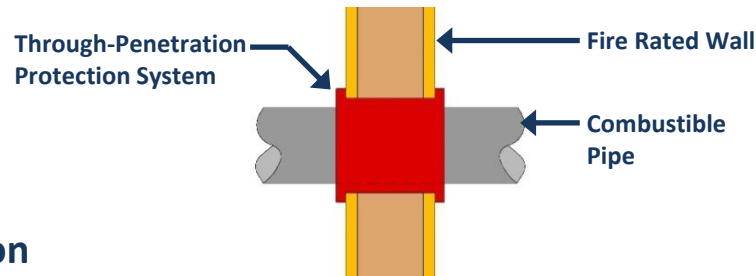
The fire partition wall is allowed to terminate at a ceiling membrane of a roof/ceiling assembly that is at least one layer of 5/8-inch thick drywall; why? - attic draftstopping is required as per IBC section 717.4.2.

## IBC 709.4 Continuity

Fire partitions shall extend from the top of the foundation or floor/ceiling assembly to the underside of the floor or roof sheathing above or to the fire-resistance-rated floor/ceiling or roof/ceiling assembly above.

## 709.7 Penetrations

Penetrations of fire partitions shall comply with Section 713.



# R2 DWELLING SEPARATIONS HORIZONTAL ASSEMBLY

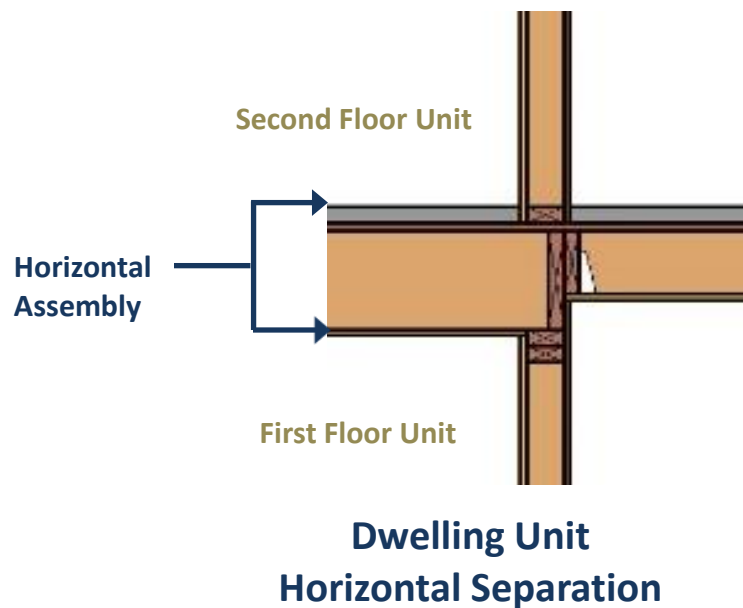
## IBC 712.3 Fire-resistance rating.

The fire-resistance rating of floor and roof assemblies shall not be less than that required by the building type of construction. Horizontal assemblies separating dwelling units in the same building and horizontal assemblies separating sleeping units in the same building shall be a minimum of 1-hour fire-resistance-rated construction.

Exception: Dwelling unit and sleeping unit separations in buildings of Type IIB, IIIB and VB construction shall have fire-resistance ratings of not less than 1/2 hour in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

The exception for dwelling and sleeping unit separations in unprotected types of construction is based on the protection provided by a sprinkler system installed in accordance with Section 903.3.1.1.

This presumably will reduce the potential fire exposure of the unit separation to that which makes a minimum 1/2-hour fire-resistance rating adequate.



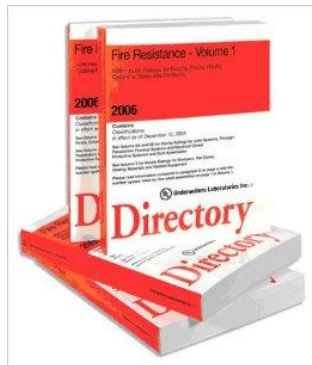
# R2 DWELLING SEPARATIONS

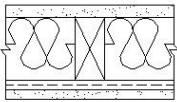
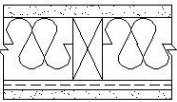
## DETERMINING FIRE RATINGS

### IBC 703.3 Alternative Methods for Determining Fire Resistance.

The application of any of the alternative methods listed in this section shall be based on the fire exposure and acceptance criteria specified in ASTM E 119 or UL 263. The required fire resistance of a building element, component or assembly shall be permitted to be established by any of the following methods or procedures:

#### 1. Fire-resistance designs documented in sources. Examples of Design Documentations:



WALLS AND INTERIOR PARTITIONS, WOOD FRAMED			
GA FILE NO. WP 3241	PROPRIETARY†	1 HOUR FIRE	50 to 54 STC SOUND
<b>GYPSUM WALLBOARD, RESILIENT CHANNELS, MINERAL FIBER INSULATION, WOOD STUDS</b> Resilient channels 24" o.c. attached at right angles to ONE SIDE of 2 x 4 wood studs 16" or 24" o.c. with 1 1/4" Type S drywall screws. One layer 5/8" proprietary type X gypsum wallboard or gypsum veneer base applied parallel to channels with 1" Type S drywall screws 12" o.c. End joints backblocked with resilient channels. 3" mineral fiber insulation, 2.0 or 2.3 pcf, in stud space.  OPPOSITE SIDE: one layer 5/8" proprietary type X gypsum wallboard or gypsum veneer base applied at right angles to studs with 1 1/4" Type W drywall screws 12" o.c.  Vertical joints staggered 48" on opposite sides. Sound tested with studs 16" o.c. and open face of mineral fiber insulation blankets toward resilient channel-side of stud space. <b>(LOAD-BEARING)</b>			
<b>PROPRIETARY GYPSUM BOARD</b> American Gypsum Company 5/8" FIREBLOC TYPE C CertainTeed Gypsum, Inc. 5/8" ProRoc™ Type C Gypsum Panels G-P Gypsum 5/8" ToughRock® Fireguard® C Lafarge North America Inc. 5/8" Firecheck® Type C National Gypsum Company 5/8" Gold Bond® Brand FIRE-SHIELD CTM Gypsum Wallboard PABCO Gypsum 1/2" FLAME CURB® Super 'C' Temple-Inland Forest Products Corporation 5/8" TG-C		Thickness: 5 3/8" Approx. Weight: 7 psf Fire Test: Based on UL R3660-7, 11-12-87; UL R2717-61, 8-18-87; UL R7094, 10-24-90; UL Design U311 Sound Test: Estimated	
†Contact the manufacturer for more detailed information on proprietary products.			

### Typical Design Assembly Documentation



# R2 DWELLING SEPARATIONS

## DETERMINING FIRE RATINGS - CONTINUED

2. Prescriptive designs of fire-resistance-rated building elements, components or assemblies as prescribed in Section 720.

### SECTION 720 PRESCRIPTIVE FIRE RESISTANCE

#### IBC 720.1 General.

The provisions of this section contain prescriptive details of fire-resistance-rated building elements, components or assemblies. The materials of construction listed in Tables 720.1(1), 720.1(2), and 720.1(3) shall be assumed to have the fire-resistance ratings prescribed.

Where materials that change the capacity for heat dissipation are incorporated into a fire-resistance-rated assembly, fire test results or other substantiating data shall be made available to the building official to show that the required fire-resistance-rating time period is not reduced.

TABLE 720.1(2)—continued  
RATED FIRE-RESISTANCE PERIODS FOR VARIOUS WALLS AND PARTITIONS <sup>a, b, c</sup>

MATERIAL	ITEM NUMBER	CONSTRUCTION	MINIMUM FINISHED THICKNESS FACE-TO-FACE <sup>b</sup> (inches)			
			4 hour	3 hour	2 hour	1 hour
11. Noncombustible studs—interior partition with plaster each side	11-1.1	$3\frac{1}{4}" \times 0.044"$ (No. 18 carbon sheet steel gage) steel studs spaced 24" on center. $\frac{3}{8}"$ gypsum plaster on metal lath each side mixed 1:2 by weight, gypsum to sand aggregate.	—	—	—	$4\frac{3}{4}"^d$
	11-1.2	$3\frac{3}{8}" \times 0.055"$ (No. 16 carbon sheet steel gage) approved nailable <sup>c</sup> studs spaced 24" on center. $\frac{3}{8}"$ neat gypsum wood-fibered plaster each side over $\frac{3}{4}"$ rib metal lath nailed to studs with 6d common nails, 8" on center. Nails driven $1\frac{1}{4}"$ and bent over.	—	—	$5\frac{3}{8}"$	—
	11-1.3	$4" \times 0.044"$ (No. 18 carbon sheet steel gage) channel-shaped steel studs at 16" on center. On each side approved resilient clips pressed onto stud flange at 16" vertical spacing, $\frac{1}{4}"$ pencil rods snapped into or wire tied onto outer loop of clips, metal lath wire-tied to pencil rods at 6" intervals, 1" perlite gypsum plaster, each side.	—	$7\frac{5}{8}"^d$	—	—
	11-1.4	$2\frac{1}{2}" \times 0.044"$ (No. 18 carbon sheet steel gage) steel studs spaced 16" on center. Wood fibered gypsum plaster mixed 1:1 by weight gypsum to sand aggregate applied on $\frac{3}{4}"$ pound metal lath wire tied to studs, each side. $\frac{3}{4}"$ plaster applied over each face, including finish coat.	—	—	$4\frac{1}{4}"^d$	—
12. Wood studs interior partition with plaster each side	12-1.1 <sup>b, c</sup>	$2" \times 4"$ wood studs 16" on center with $\frac{3}{8}"$ gypsum plaster on metal lath. Lath attached by 4d common nails bent over or No. 14 gage by $1\frac{1}{2}"$ by $\frac{3}{4}"$ crown width staples spaced 6" on center. Plaster mixed 1:1 $\frac{1}{2}$ for scratch coat and 1:3 for brown coat, by weight, gypsum to sand aggregate.	—	—	—	$5\frac{1}{8}"$
	12-1.2 <sup>c</sup>	$2" \times 4"$ wood studs 16" on center with metal lath and $\frac{7}{8}"$ neat wood-fibered gypsum plaster each side. Lath attached by 6d common nails, 7" on center. Nails driven $1\frac{1}{4}"$ and bent over.	—	—	$5\frac{1}{2}"^d$	—
	12-1.3 <sup>c</sup>	$2" \times 4"$ wood studs 16" on center with $\frac{3}{8}"$ perforated or plain gypsum lath and $\frac{1}{2}"$ gypsum plaster each side. Lath nailed with $1\frac{1}{8}"$ by No. 13 gage by $\frac{19}{64}"$ head plasterboard blue nails, 4" on center. Plaster mixed 1:2 by weight, gypsum to sand aggregate.	—	—	—	$5\frac{1}{4}"$
	12-1.4 <sup>c</sup>	$2" \times 4"$ wood studs 16" on center with $\frac{3}{8}"$ Type X gypsum lath and $\frac{1}{2}"$ gypsum plaster each side. Lath nailed with $1\frac{1}{8}"$ by No. 13 gage by $\frac{19}{64}"$ head plasterboard blue nails, 5" on center. Plaster mixed 1:2 by weight, gypsum to sand aggregate.	—	—	—	$5\frac{1}{4}"$
13. Noncombustible studs—interior partition with gypsum wallboard each side	13-1.1	$0.018"$ (No. 25 carbon sheet steel gage) channel-shaped studs 24" on center with one full-length layer of $\frac{3}{4}"$ Type X gypsum wallboard <sup>c</sup> applied vertically attached with 1" long No. 6 drywall screws to each stud. Screws are 8" on center around the perimeter and 12" on center on the intermediate stud. The wallboard may be applied horizontally when attached to $3\frac{3}{8}"$ studs and the horizontal joints are staggered with those on the opposite side. Screws for the horizontal application shall be 8" on center at vertical edges and 12" on center at intermediate studs.	—	—	—	$2\frac{7}{8}"^d$
	13-1.2	$0.018"$ (No. 25 carbon sheet steel gage) channel-shaped studs 25" on center with two full-length layers of $\frac{1}{2}"$ Type X gypsum wallboard <sup>c</sup> applied vertically each side. First layer attached with 1"-long, No. 6 drywall screws, 8" on center around the perimeter and 12" on center on the intermediate stud. Second layer applied with vertical joints offset one stud space from first layer using $1\frac{3}{8}"$ long, No. 6 drywall screws spaced 9" on center along vertical joints, 12" on center at intermediate studs and 24" on center along top and bottom runners.	—	—	$3\frac{5}{8}"^d$	—
	13-1.3	$0.055"$ (No. 16 carbon sheet steel gage) approved nailable metal studs 24" on center with full-length $\frac{3}{4}"$ Type X gypsum wallboard <sup>c</sup> applied vertically and nailed 7" on center with 6d cement-coated common nails. Approved metal fastener grips used with nails at vertical butt joints along studs.	—	—	—	$4\frac{7}{8}"$

From Table 720.1



# R2 DWELLING SEPARATIONS

## DETERMINING FIRE RATINGS - CONTINUED

### 3. Calculations in accordance with Section 721.

The provisions of this section is to provide a number of useful alternatives for establishing compliance with the code. The provisions in this section can be used not only to calculate the fire-resistive rating for an assembly but it also contains provisions that would permit modifications or changes to a tested assembly.

Where would you use Calculation Method for Assembly: An existing building, such as a Historical Building with construction of uncommon building materials.

Example:  
Converting a Former  
City Hall Building into  
R-2 Apartments.



#### EXAMPLE CALCULATION

Itemized Wall Detail	Time (min.)	IBC Table
Side 1: 5/8" Plaster on 3/8" Lath:	40	721.2.1.4(2)
Framing: Studs @ 16" O.C.:	20	721.6.2(2)
Side 2: 5/8" Plaster on 3/8" Lath:	40	721.2.1.4(2)
Total Assembly Rating:	100	

### 4. Engineering analysis based on a comparison of building elements, component or assemblies designs having fire-resistance ratings as determined by the test procedures set forth in ASTM E 119 or UL 263.

An approved engineering analysis allows information generated from previous fire tests through empirical calculations. It is important to note that all analytical methods of calculating fire-resistance ratings must be substantiated as being based on the fire exposure and acceptance criteria of ASTM E 119 or UL 263

### 5. Alternative protection methods as allowed by Section 104.11.

An alternative protection may be provided if approved by the building official.



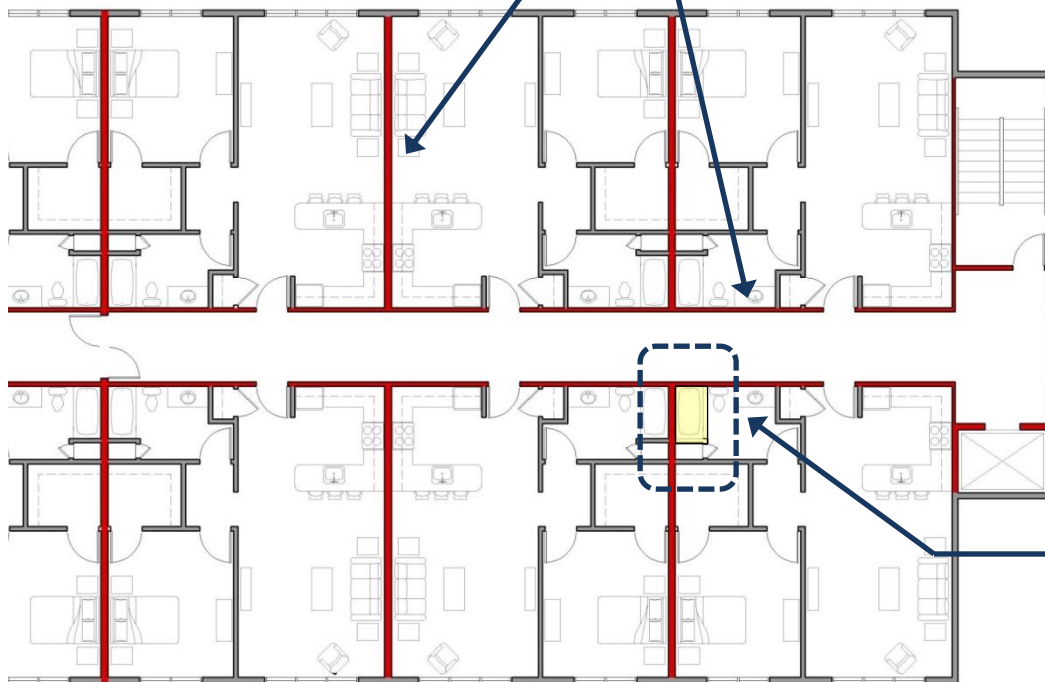
# R-2 APARTMENTS

## COMMON CONSTRUCTION/DRAWINGS MISTAKES OR MISINTERPRETATIONS

### All Fire Rated Wall

#### Common Field Misinterpretations:

- All Rated Walls are called “Fire Walls”.



### Fire Rated Walls:

#### Common Drawing and/or Field Errors:

- UL Design Assembly Details are not on the Drawings.
- Walls are not being constructed per the UL Assembly such as; screw spacing, staggered drywall joints, screw heads covered with compound, single or double layer tape, paper tape (no mesh tape), etc.
- Not knowing the difference in the Rated Wall Type Vertical Continuity.

### Area Increase:

You can not use building-area increase for sprinkler when using a NFPA 13R sprinkler system.

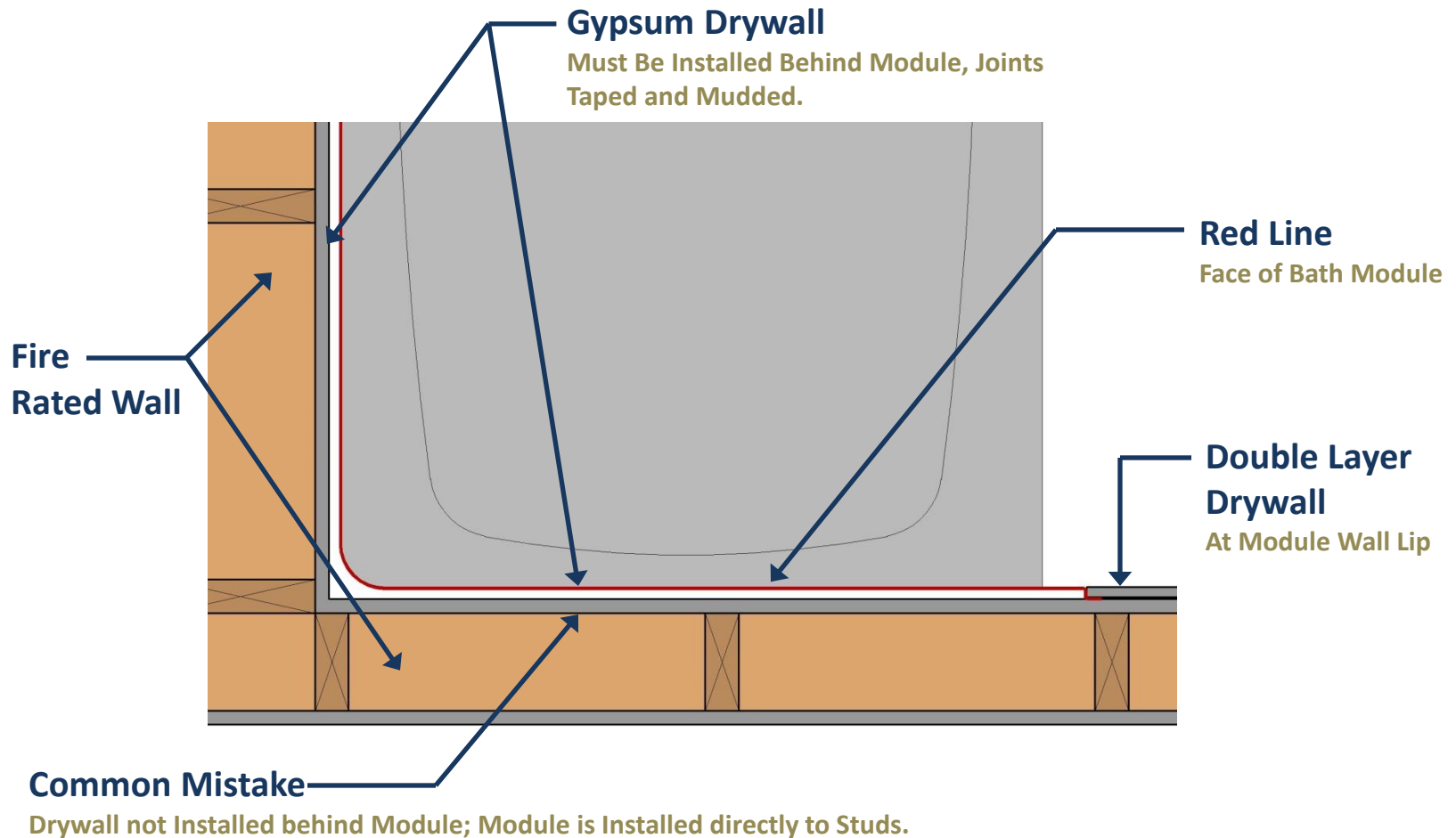
### Bath/Shower Modules:

#### Common Field Error:

- Bath/Shower Modules Adjacent to Fire Rated Walls - Drywall not Installed Correctly.



# R-2 APARTMENTS – BATH MODULES ADJACENT TO FIRE RATED WALLS INSTALLATION



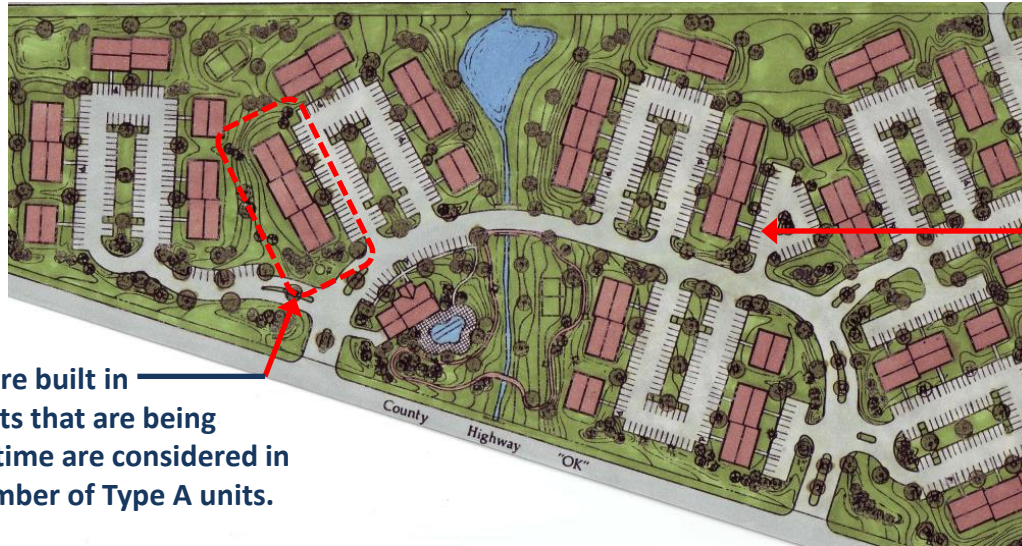
# MULTI-FAMILY ACCESSIBILITY

## TYPE “A” & TYPE “B” UNITS

### IBC 1107.6.2.1.1 Type A Units

In Group R-2 occupancies containing more than 20 dwelling units, at least 2 percent but not less than one of the units shall be a Type A unit. Type A Units are considered fully accessible

All R-2 units on a site shall be considered to determine the total number of units and the required number of Type A units; but if the development is built in stages, only the units that are being constructed as part of that development phase are considered in determining the number of Type A units.



Multi-Family R-2 Development

When Apartments are built in phases, only the units that are being constructed at that time are considered in determining the number of Type A units.

Multi-Family developments will provide 1, 2 and 3 bedroom Unit Types and the Type A units must be scattered throughout the different Unit Types.



# MULTI-FAMILY ACCESSIBILITY

## TYPE “A” & TYPE “B” UNITS

### IBC 1107.6.2.1.2 Type B Units

When there are four or more dwelling units occupied as a residence in a single structure, every dwelling unit and sleeping unit intended to be occupied as a residence shall be a Type B unit. Type B Units provide a minimum level of accessibility and are more easily adaptable.

### SPS 362.1107 (b) Group R-2 - Dwelling Units and Sleeping Units

1. Apartment houses, monasteries and convents. Substitute the following wording for the requirement, but not the exception, in IBC section 1107.6.2.1.2: Where there are three or more dwelling units intended to be occupied as a residence in a single structure, every dwelling unit and sleeping unit intended to be occupied as a residence shall be a Type B unit.
2. Boarding houses, dormitories, fraternity houses and sorority houses. Substitute the following wording for the requirement, but not the exception, in IBC section 1107.6.2.2.2: Where there are three or more dwelling units or sleeping units intended to be occupied as a residence in a single structure, every dwelling unit and sleeping unit intended to be occupied as a residence shall be a Type B unit.

**Type A Units may be substituted for a Type B Unit but not Vice-Versa.**

### IBC 1107.7.2 Multistory Units.

A multistory R-2 building with no elevator service is not required to be a Type B unit. Where a multistory building is provided with external elevator service to only one floor, the floor provided with elevator service shall be the primary entry to the unit and shall comply with the requirements for a Type B unit.



# MULTI-FAMILY ACCESSIBILITY

## Type “A” vs Type “B”

Type “A” Units	Type “B” Units
Parking “A”	Parking “B”
<p><b>IBC 1106.2 Groups R-2</b></p> <p>At least 2 percent, but not less than one, of each type of parking space provided for occupancies in Groups R-2, which are required to have Accessible Type A or Type B dwelling or sleeping units, shall be accessible. Where parking is provided within or beneath a building, accessible parking spaces shall also be provided within or beneath the building.</p>	
Primary Entrance “A”	Primary Entrance “B”
<p><b>ANSI 1003.2 Primary Entrance</b></p> <p>The accessible primary entrance shall be on an accessible route from public and common areas.</p> <p>At least one accessible route shall connect all spaces and elements part of the unit. Accessible routes shall be located in the same area as a general circulation path.</p>	<p><b>ANSI 1004.2 Primary Entrance.</b></p> <p>The same as the Type “A” Unit except for the following spaces and elements within the unit:</p> <p>EXCEPTIONS: Basements that are part of the unit, a raised or sunken floor area in a portion of a living, dining, sleeping room; a mezzanine that does not have plumbing fixtures or an enclosed habitable space, or a exterior deck.</p>
Doors “A”	Doors “B”
<p><b>ANSI 404.2.2 Clear Width</b></p> <p>Doorways shall have a clear opening width of 32 inches. Clear opening width of doorways with swinging doors shall be measured between the face of door and stop, with the door open 90 degrees.</p>	



# MULTI-FAMILY ACCESSIBILITY

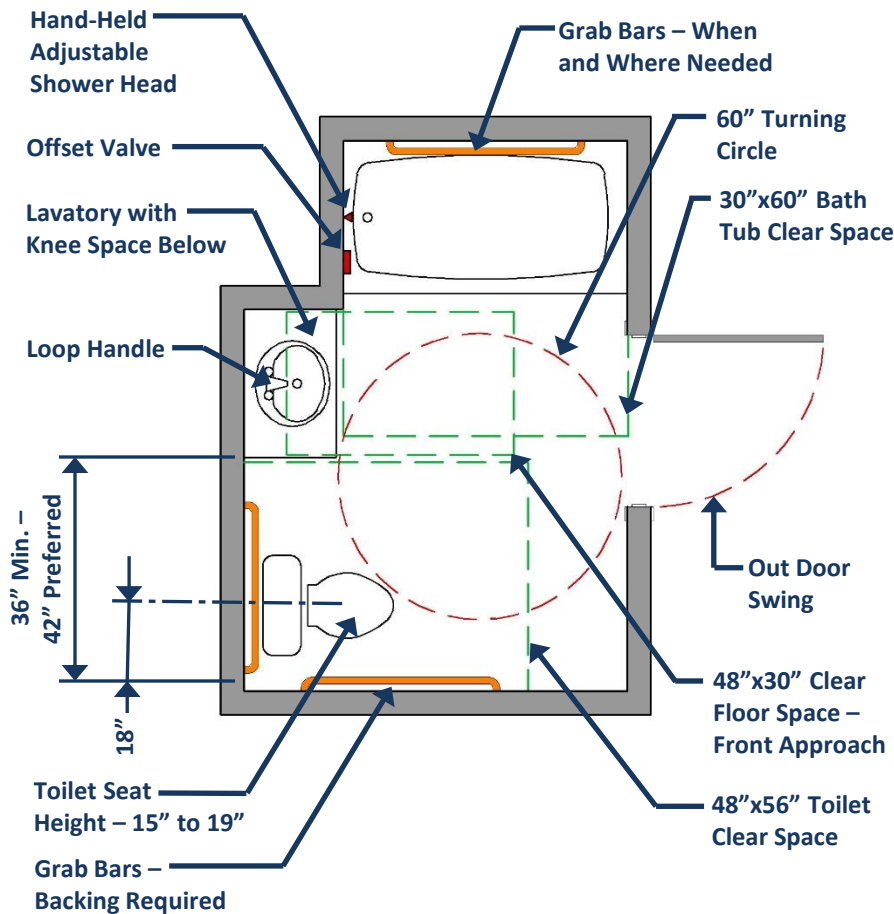
## Type “A” vs Type “B” UNITS

Bathrooms “A”	Bathrooms “B”
<p><b>ANSI 1003.11 Bathing Facilities</b></p> <p>Primary bathroom (only) shall be fully accessible. <u>60” turning space is required, door may swing into turning space by 12”,</u> clear space requirements at fixtures.</p>	<p><b>ANSI 1004.11 Bathing Facilities</b></p> <p>All bathrooms must be usable with a lesser level of accessibility. <u>Clear space requirements at toilets, tubs, showers, and lavatories but the 60” turning radius is not required.</u></p>
Kitchens “A”	Kitchens “B”
<p><b>ANSI 1003.12 Kitchens</b></p> <p><u>A 60” turning space and a 30” x 48” clear space at every appliance is required.</u> Must have accessible or adjustable worktop with knee space below. Sink is required to have knee space and accessible faucet controls. At least one storage unit shelf must be 48” above finish floor. Cabinet hardware shall be accessible.</p>	<p><b>ANSI 1004.12 Kitchens</b></p> <p>Minimum 40” clearance between all counters except in “U” shaped kitchens with sink, range or range – 60” turning space or knee space provided. Parallel approach required at sink unless a “U” shape kitchen. A 30” x 48” clear space required at range.</p>
Controls “A”	Controls “B”
<p><b>1003.9 Operable Parts.</b></p> <p>Lighting controls, electrical switches and outlets, thermostats, appliance controls, operating hardware for operable windows, plumbing fixture controls, and controls for security systems shall comply with Section 309.</p>	<p><b>IBC 1004.9 Operable Parts</b></p> <p>Shall be in accessible locations.</p>
<p>IBC 907.5.2.3.4 – The requirement that all dwelling units be provided with the capability to support visible notification does not require the wiring and boxes for a future installation. Code officials can allow other methods proposed by the designer.</p>	

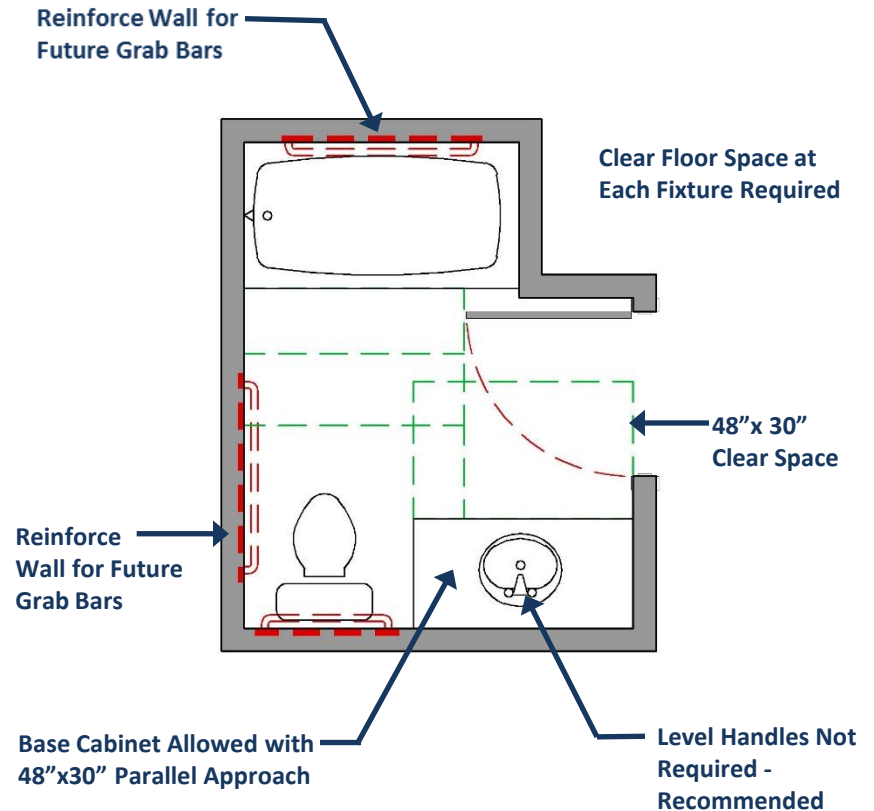


# MULTI-FAMILY ACCESSIBILITY

## TYPE "A" & "B" BATHROOMS



**Type "A" Bathroom**  
9'-3" x 7'-0"

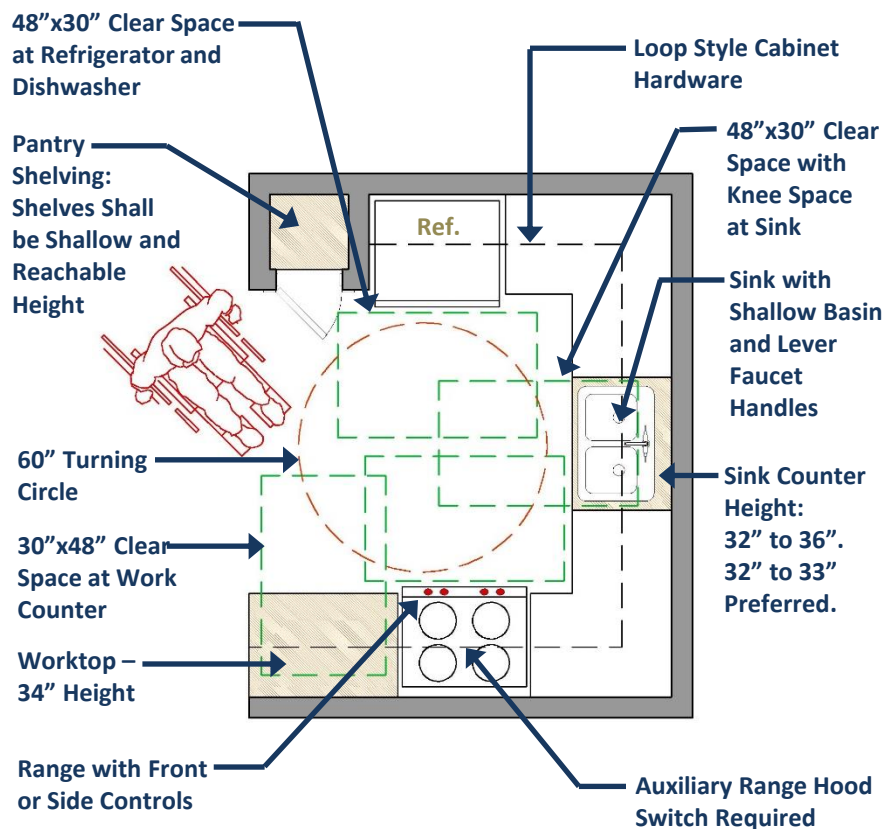


**Type "B" Bathroom**  
5'-10" x 9'-0"

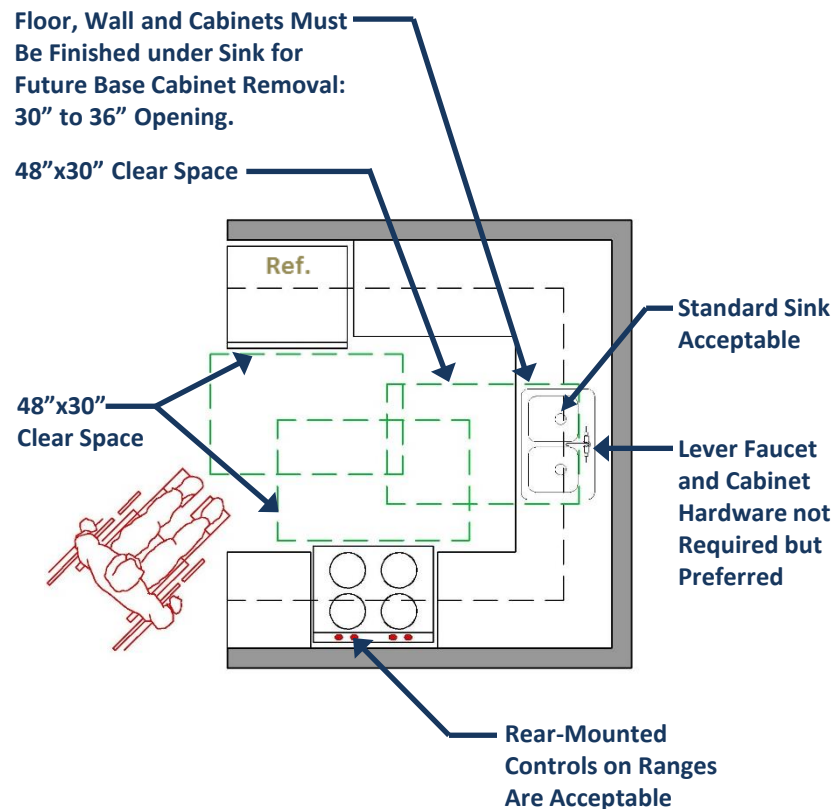


# MULTI-FAMILY ACCESSIBILITY

## TYPE "A" & "B" KITCHENS



**Type "A" Kitchen**  
10'-6" x 8'-6"



**Type "B" Kitchen**  
8'-6" x 8'-0"



# ANSI 303 CHANGE IN LEVEL PATIO THRESHOLD

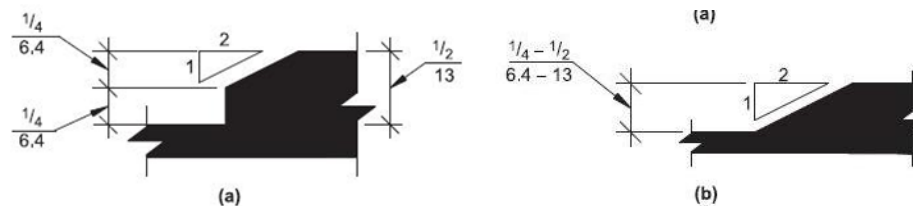
**ANSI 303.2 VERTICAL** – Changes in level of  $\frac{1}{4}$ " maximum in height shall be permitted to be vertical.



**Figure 303.2**

**ANSI 303.3 BEVELED** – Changes in level greater than  $\frac{1}{4}$ " in height and not more than  $\frac{1}{2}$ " maximum in height shall be beveled with a slope not steeper than 1:2.

Changes in level greater than  $\frac{1}{2}$ " in height shall be ramped per ANSI Sections 405 and 406.

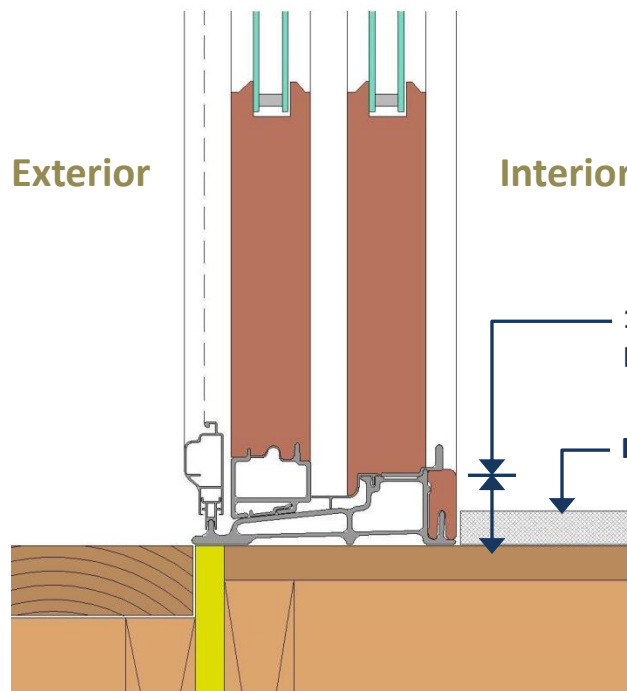


**Figures 303.3(a) and (b)**

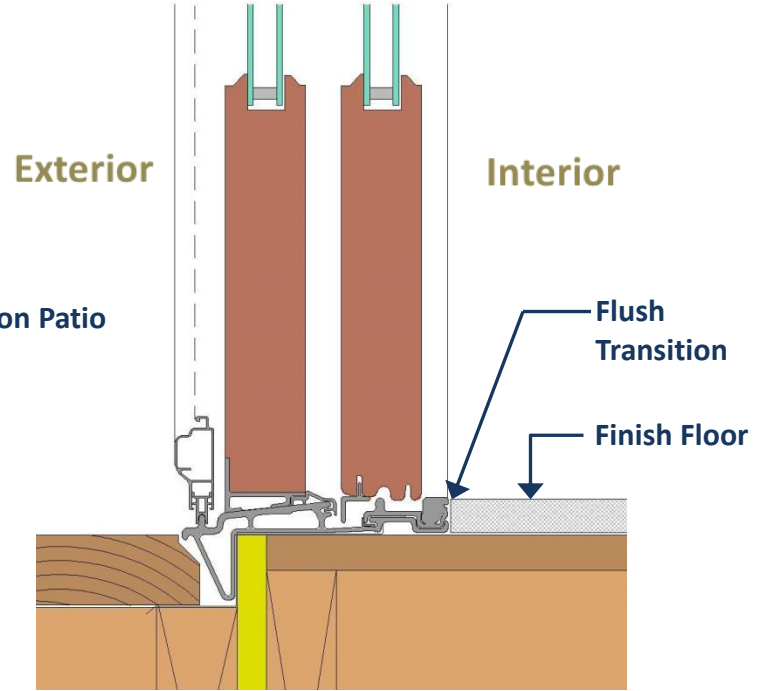


# TYPE “A” PATIO THRESHOLDS

## TYPICAL RESIDENTIAL VS ADA COMPLIANT



**Standard Residential Patio  
Door Threshold**



**ADA Compliant Patio  
Door Threshold**



# PATIO DOOR ACCESSIBILITY REQUIREMENTS

## ANSI 404.2.2 Clear Width.

Accessible doors should provide at least 32 inches of clear width. Clear width is measured between the face of the door itself and the opposite stop – including screen door.

## ANSI 404.2.6 Door and Gate Hardware.

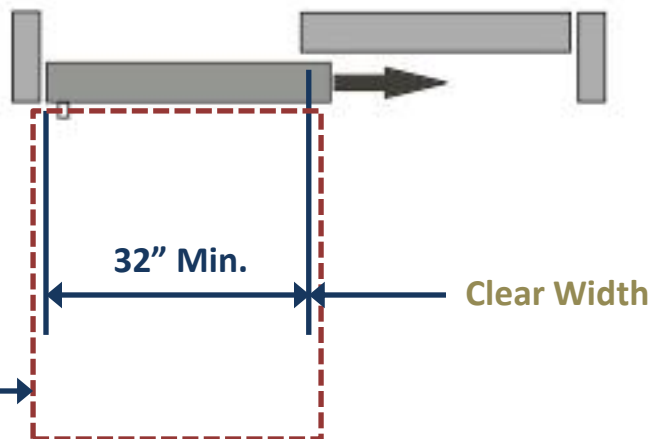
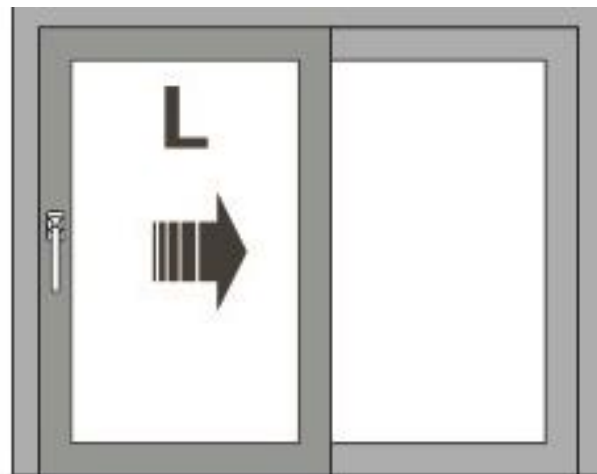
Hardware shall comply with 309.4 and shall be 34 inches minimum and 48 inches maximum above the finish floor or ground. Where sliding doors are in the fully open position, operating hardware shall be exposed and usable from both sides.

## 404.2.3 Maneuvering Clearances.

Front Approach: 48"

## ANSI 404.2.8 Door and Gate Opening Force.

Sliding or folding doors: 5 pounds maximum.



# ALTERATIONS TECHNICALLY INFEASIBLE

## Technical Infeasibility

IEBC 605.1 Alterations. A building, facility or element that is altered shall comply with the applicable provisions in Chapter 11 of the IBC and ICC A117.1, unless technically infeasible. Where compliance with this section is technically infeasible, the alteration shall provide access to the maximum extent technically feasible.

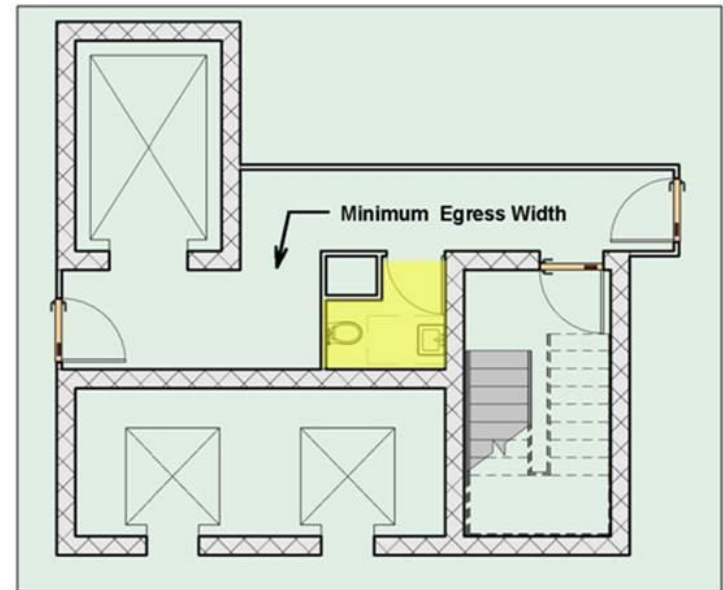
## Example of Technical Infeasibility

It may be technically infeasible in an alteration to enlarge a toilet room confined in size by structural supports, elevator shafts, mechanical rooms and chases, stairways, or required egress routes not affected by the project.

In this case, the toilet room must be sized and other requirements, such as plumbing fixtures, must be met to the maximum extent of being technically feasible.

Other examples where compliance could potentially be technically infeasible include:

- Conflicts with related building codes.
- Slope requirements on existing developed sites located on steep terrain where re-grading and other design solutions are not feasible.
- Work that would impact load-bearing walls and other essential components of the structure.



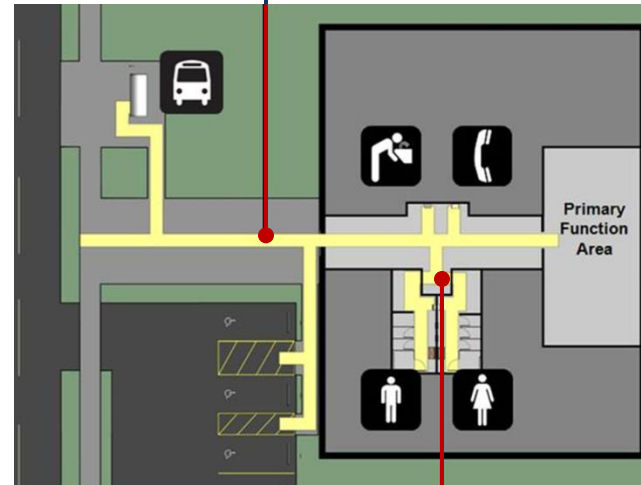
# ALTERATION - PRIMARY FUNCTION

IEBC 605.2 Where an alteration affects the accessibility to, or contains an area of primary function, the route to the primary function area shall be accessible. The accessible Path of Travel to the primary function area shall include toilet facilities or drinking fountains serving the area of primary function.

Exceptions:

1. The costs of providing the accessible route are not required to exceed **20 percent of the costs** of the alterations affecting the area of primary function.
2. This provision does not apply to alterations solely to windows, hardware, operating controls, electrical outlets and signs.
3. This provision does not apply to alterations limited solely to MEP installation or abatement of hazardous materials.
4. This provision does not apply to alterations undertaken for increasing the accessibility of an existing building.

The Accessible Path of Travel  
Extends from the Altered Primary  
Function Area to Site Arrival Points  
such as: public sidewalks, parking,  
passenger loading zones, public  
transit stops located on the site.



The Path of Travel also Includes an Accessible Restroom (for each sex),  
telephone, and drinking fountain serving the Primary Function Area.



# ADA – DISPROPORTIONALITY

## 20% Disproportionality

The accessible path of travel is required to the extent that it is not “disproportionate” to the total cost. Regulations implementing the standards define “disproportionate” as exceeding 20% of the total cost of alterations to the primary function area. The 20% cap applies only to costs associated with the accessible path of travel, including an accessible route to the primary function area from site arrival points, entrances, and retrofits to restrooms, telephones, and drinking fountains.

## Prioritization

Compliance is required up to the point the 20% cost cap is reached, even where it does not result in a fully accessible path of travel. Where costs exceed this cap, compliance should be prioritized in this order:

1. An accessible entrance.
2. An accessible route to the primary function area.
3. A restroom access.
4. An accessible telephone.
5. An accessible drinking fountain.
6. Access to other elements such as parking or storage.



# ADA – DISPROPORTIONALITY

## SBD-10219 Disproportionality Form

<b>A. Total Cost of Alteration to Primary Function Area.</b> (Excluding costs in B.)		\$ _____	← <b>Total Cost of Alteration</b> Does <u>Not</u> Include Plumbing, HVAC or Electrical
<b>Minimum Costs for Accessible Route:</b> (When the cost of providing an accessible route exceeds 20 percent of the total cost of the alteration, the cost is considered disproportionate)		\$ _____	← <b>20% of Line A (Line A1)</b>
<b>B. Costs Required to Provide an Accessible Route:</b> (Listed in order of suggested priority in the event the cost is disproportionate)			
1. Costs associated with providing an accessible route to the altered area: (Route is from exterior to the altered area, including entrance and parking):	\$ _____	← <b>Exterior Accessible Route Costs</b>	
• Costs associated with providing an accessible entrance:	\$ _____	← <b>Cost for Accessible Entrance</b>	
• Costs associated with providing components of an accessible route (Ramps, elevators, platform lifts):	\$ _____	← <b>Cost for Accessible Route Components</b> Such as: Ramps, Elevator, Lifts	
• Costs associated with providing accessible elements such as parking:	\$ _____	← <b>Accessible Parking</b>	
2. Costs associated with making toilet rooms accessible:	\$ _____	← <b>Converts Toilet Rooms to Accessibility</b>	
3. Costs associated with relocating an inaccessible drinking fountain:	\$ _____	← <b>Cost for Accessible Drinking Fountain</b>	
<b>Total Costs to Provide an Accessible Route:</b>	\$ _____	← <b>Total Cost (Line B1)</b>	
<b>C. Disproportionate Costs:</b> If the total cost of the expenditures in B. is greater than 20% of the total cost of the alteration in A., list the elements and spaces being provided that will equal or exceed 20% of the total cost of the alteration. If a non-accessible item exceeds 20% and all other elements and spaces along the accessible route comply with the current accessibility requirements, the additional expenditure is not required		← <b>If Line B1 &gt; Line A1</b> List the Items that Equal or Exceed the 20% Value that will be provided with the Proposed Alteration.	



# Questions or Comments

